Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 1

Exercise 1

Consider the vectorial field $F(x,y,z) = (6 x y^2 + y z e^{x y z} + y z e^{x y z} (x y z - 3 y)$
$, 6 x^2 y + x z e^{x y z} (x y z - 3 y) + (x z - 3) e^{x y z} + 2, x y e^{x y z} + x y e^{x y z} (x y z - 3 y)$
). Compute the potential function for this field whose potential at the origin is -1.

. Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) −5.09412 2) 4.50588 3) −1.29412 4) −8.69412

Exercise 2

Compute the area of the domain whose boundary is the curve

$r: [0,\pi] \longrightarrow R^2$
$r(t) = \{ (8 t + 2) \sin(2 t) (8 \cos(2 t) + 8), (4 t + 7) \sin(t) (8 \cos(2 t) + 8) \}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 9575.15 2) 10 851.8 3) 4468.75 4) 6383.65

Exercise 3

Consider the vectorial field $F(x,y,z) = \{7 y, -7 y^2, 4 y z - 5 y z^2\}$ and the surface

$$S \equiv \left(\frac{7 + x}{1}\right)^2 + \left(\frac{-4 + y}{6}\right)^2 + \left(\frac{-7 + z}{1}\right)^2 = 1$$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 15 282.2 2) −8042.48 3) −37 801.6 4) −23 324.2

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 2

Exercise 1

Consider the vectorial field F(x,y,z) = ($2 x y^2, 2 x^2 y + 3 z e^{y z} + z e^{y z} (3 y z - 2), 3 y e^{y z} + y e^{y z} (3 y z - 2)$). Compute the potential function for this field whose potential at the origin is 3.

. Calculate the value of the potential at the point p=(-8,5,4).

1) $-\frac{196977072541}{5} + 58 e^{20}$ 2) $-\frac{309535404293}{5} + 58 e^{20}$

3) $-\frac{126628115196}{5} + 58 e^{20}$ 4) $1605 + 58 e^{20}$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r: [0,\pi] \dashrightarrow R^2$
$r(t) = \{ (4 t + 4) \sin(2 t) (8 \cos(4 t) + 9), (4 t + 8) \sin(t) \}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 1761.45   2) 377.652   3) 1132.45   4) 1258.25

Exercise 3

Consider the vectorial field $F(x,y,z) = \{-x^2 z + 6 y z, -5 x y, -6 y z^2 - 8 x y z^2\}$ and the surface

$S \equiv \left(\frac{6 + x}{1}\right)^2 + \left(\frac{2 + y}{5}\right)^2 + \left(\frac{-4 + z}{9}\right)^2 = 1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 44787.4   2) -111966.   3) -11196.1   4) 134361.

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 3

Exercise 1

Consider the vectorial field $F(x,y,z)=($
$-\sin(x\,y\,z) - x\,y\,z\cos(x\,y\,z) + 1, -x^2\,z\cos(x\,y\,z), -x^2\,y\cos(x\,y\,z)$
$)$. Compute the potential function for this field whose potential at the origin is 3.

. Calculate the value of the potential at the point $p=(-10,8,0)$.

1) -7 2) $-\frac{273}{10}$ 3) $\frac{63}{10}$ 4) $-\frac{231}{10}$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,2\pi]\text{-----}\rightarrow R^2$

$$r(t)=\left\{\frac{\left(-\frac{(1+\sqrt{3})\sin(t)}{2\sqrt{2}}-\frac{\sqrt{3}-1}{2\sqrt{2}}\right)\cos(t)\,(5\cos(t)+7)}{\sin^2(t)+1},\frac{\left(\frac{1+\sqrt{3}}{2\sqrt{2}}-\frac{(\sqrt{3}-1)\sin(t)}{2\sqrt{2}}\right)\cos(t)\,(5\cos(t)+7)}{\sin^2(t)+1}\right\}$$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 112.46 2) 70.4602 3) 49.4602 4) 77.4602

Exercise 3

Consider the vectorial field $F(x,y,z)=$
$\{5x-\text{Sin}[2y^2+2z^2], z-5yz+\text{Sin}[2x^2], 5xyz+\text{Cos}[2x^2+y^2]\}$ and the surface

$S\equiv\left(\frac{5+x}{6}\right)^2+\left(\frac{y}{7}\right)^2+\left(\frac{-6+z}{9}\right)^2=1$

Compute $\int_S F.$

Indication: Use Stoke's Theorem if it is necessary.

1) 35 627.4 2) $-154\,381.$ 3) $-39\,584.1$ 4) $-130\,630.$

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 4

Exercise 1

Consider the vectorial field $F(x,y,z)=($
$4xy-3y\sin(xy)+y(-3xy-1)\cos(xy)+y^2, 2x^2+2xy-3x\sin(xy)+x(-3xy-1)\cos(xy)$
$,0)$. Compute the potential function for this field whose potential at the origin is -4.

. Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) -18.0536 2) -4.05365 3) 12.4464 4) 9.44635

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]\dashrightarrow R^2$
$r(t)=\{(7t+9)\sin(2t)(8\cos(18t)+9), (7t+6)\sin(t)\}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 1670.88 2) 7098.38 3) 3340.88 4) 4175.88

Exercise 3

Consider the vectorial field $F(x,y,z)=\{-3z^2-2x^2y^2z^2, 5x^2y^2z, 4xy+7y^2z^2\}$ and the surface

$S\equiv\left(\frac{3+x}{8}\right)^2+\left(\frac{8+y}{7}\right)^2+\left(\frac{4+z}{4}\right)^2=1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) -3.14858×10^7 2) 1.85211×10^7 3) -4.25985×10^7 4) 7.03801×10^7

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 5

Exercise 1

Consider the vectorial field $F(x,y,z) = \left(\frac{y z (3 x z - 3 y z)}{x y z + 1} + 3 z \log(x y z + 1), \frac{x z (3 x z - 3 y z)}{x y z + 1} - 3 z \log(x y z + 1), \frac{x y (3 x z - 3 y z)}{x y z + 1} + (3 x - 3 y) \log(x y z + 1)\right)$. Compute the potential function for this field whose potential at the origin is -1.

. Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) 2. 2) −1. 3) −3.4 4) −1.9

Exercise 2

Compute the area of the domain whose boundary is the curve

$r: [0,\pi] \longrightarrow R^2$

$r(t) = \{(2 t + 8) \sin(2 t) (8 \cos(6 t) + 9), (5 t + 1) \sin(t) (8 \cos(6 t) + 9)\}$

Indication: it is necessary to represent the curve to check whether it has intersection points.

1) 20079. 2) 13901. 3) 15445.5 4) 16990.

Exercise 3

Consider the vectorial field $F(x,y,z) = \{-5 z^2 + 3 x y^2 z^2, x^2 y z - 5 y^2 z^2, 7 z^2 + 6 x^2 y z^2\}$ and the surface

$S \equiv \left(\frac{6 + x}{9}\right)^2 + \left(\frac{-5 + y}{1}\right)^2 + \left(\frac{-5 + z}{2}\right)^2 = 1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 4.26864×10^6 2) -2.51096×10^6 3) 1.25548×10^6 4) 2.38541×10^6

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 6

Exercise 1

Consider the vectorial field F(x,y,z)=($6 x y^2 + x y z^2 \sin(x z) - y z \cos(x z) + 2 x, 6 x^2 y - x z \cos(x z), x^2 y z \sin(x z) - x y \cos(x z)$). Compute the potential function for this field whose potential at the origin is 2.

. Calculate the value of the potential at the point p=(6,-4,-5).

1) $\frac{8773}{2} - 120\,\mathrm{Cos}[30]$ 2) $\frac{19\,312}{5} - 120\,\mathrm{Cos}[30]$ 3) $\frac{29\,794}{5} - 120\,\mathrm{Cos}[30]$ 4) $1766 - 120\,\mathrm{Cos}[30]$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]\text{-----}\to R^2$

$r(t)=\left\{\sin(2t)\,(5\cos(t)+9)\left(\frac{(1+\sqrt{3})\cos(t)}{2\sqrt{2}} - \frac{(\sqrt{3}-1)\sin(t)}{2\sqrt{2}}\right), \sin(2t)\,(5\cos(t)+9)\left(\frac{(1+\sqrt{3})\sin(t)}{2\sqrt{2}} + \frac{(\sqrt{3}-\right.\right.$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 73.4347   2) 36.9347   3) 102.635   4) 7.73473

Exercise 3

Consider the vectorial field F(x,y,z)=
$\left\{-5+4y+\mathrm{Sin}[y^2+z^2], e^{-x^2-2z^2}+5y+4yz, -5xy+3z-\mathrm{Sin}[x^2-y^2]\right\}$ and the surface

$S \equiv \left(\frac{x}{4}\right)^2+\left(\frac{7+y}{7}\right)^2+\left(\frac{-1+z}{8}\right)^2=1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 24 770.3   2) 28 148.   3) 11 259.5   4) 38 281.1

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 7

Exercise 1

Consider the vectorial field $F(x,y,z) = (2 x y^2 z^2 (y z + 1), x^2 y^2 z^3 + 2 x^2 y z^2 (y z + 1) - 4 y, x^2 y^3 z^2 + 2 x^2 y^2 z (y z + 1))$. Compute the potential function for this field whose potential at the origin is -2.

. Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) −2.6088 2) 9.0912 3) −11.0088 4) −9.8088

Exercise 2

Compute the area of the domain whose boundary is the curve

$r : [0,\pi] \longrightarrow R^2$
$r(t) = \{(4 t + 3) \sin(2 t) (8 \cos(6 t) + 9), (5 t + 8) \sin(t)\}$

Indication: it is necessary to represent the curve to check whether it has intersection points.

1) 324.105 2) 1616.91 3) 2101.71 4) 485.705

Exercise 3

Consider the vectorial field $F(x,y,z) = \{2 - 9 x^2 y^2 z^2, 7 x^2 y^2 - 6 y z^2, -3 x y^2 z\}$ and the surface

$S \equiv \left(\frac{6 + x}{5}\right)^2 + \left(\frac{y}{5}\right)^2 + \left(\frac{2 + z}{2}\right)^2 = 1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 1.80144×10^6 2) -1.53652×10^6 3) 2.01337×10^6 4) 529834.

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 8

Exercise 1

Consider the vectorial field $F(x,y,z)=($
$x y (1-2 z) z + y z (x-2 x z) - 2 y^2 - y, -4 x y + x z (x-2 x z) - x, x y (x-2 x z) - 2 x^2 y z$
$)$. Compute the potential function for this field whose potential at the origin is -4.

. Calculate the value of the potential at the point $p=(-2,7,4)$.

1) -2601 2) 0 3) -578 4) $\frac{4913}{5}$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,2\pi] \longrightarrow R^2$

$$r(t)=\left\{\frac{\left(\frac{1}{\sqrt{2}}-\frac{\sin(t)}{\sqrt{2}}\right)\cos(t)\,(4\cos(t)+5)}{\sin^2(t)+1}, \frac{\left(\frac{\sin(t)}{\sqrt{2}}+\frac{1}{\sqrt{2}}\right)\cos(t)\,(4\cos(t)+5)}{\sin^2(t)+1}\right\}$$

Indication: it is necessary to represent
 the curve to check whether it has intersection points.

1) 38.7345 2) 12.1345 3) 23.5345 4) 19.7345

Exercise 3

Consider the vectorial field $F(x,y,z)=$
$\left\{e^{-2 y^2+2 z^2} - 2 y, 6 x + \text{Cos}\left[2 x^2 - z^2\right], -3 z - \text{Sin}\left[2 x^2 - 2 y^2\right]\right\}$ and the surface

$$S \equiv \left(\frac{-3+x}{9}\right)^2 + \left(\frac{3+y}{5}\right)^2 + \left(\frac{z}{3}\right)^2 = 1$$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) -7635.96 2) 2885.44 3) -1696.46 4) 0.539967

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 9

Exercise 1

Consider the vectorial field $F(x,y,z)=($ $x z^2 \cos(x z) + z \sin(x z) + 2 x, 0, x^2 z \cos(x z) + x \sin(x z)$ $)$. Compute the potential function for this field whose potential at the origin is 2.

. Calculate the value of the potential at the point $p=(0,-5,10)$.

1) $-\frac{4}{5}$ 2) $\frac{18}{5}$ 3) $\frac{29}{5}$ 4) 2

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,2\pi] \dashrightarrow R^2$

$$r(t)=\left\{\frac{\left(-\frac{\sin(t)}{\sqrt{2}}-\frac{1}{\sqrt{2}}\right)\cos(t)\,(9\cos(t)+10)}{\sin^2(t)+1}, \frac{\left(\frac{1}{\sqrt{2}}-\frac{\sin(t)}{\sqrt{2}}\right)\cos(t)\,(9\cos(t)+10)}{\sin^2(t)+1}\right\}$$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 169.531 2) 152.631 3) 34.331 4) 254.031

Exercise 3

Consider the vectorial field $F(x,y,z)=$
$\left\{1-4 x y z+\text{Sin}\left[y^2+2 z^2\right], 3 x y+\text{Cos}\left[x^2+2 z^2\right], e^{2 x^2-2 y^2}+3 x y z\right\}$ and the surface

$$S\equiv\left(\frac{-5+x}{1}\right)^2+\left(\frac{-8+y}{9}\right)^2+\left(\frac{-9+z}{4}\right)^2=1$$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 9228.94 2) −66 908.7 3) −23 071.9 4) −41 529.5

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 10

Exercise 1

Consider the vectorial field $F(x,y,z) = ($
$y z (3x+y) e^{xyz} + 3 e^{xyz} - 3y, x z (3x+y) e^{xyz} + e^{xyz} - 3x, x y (3x+y) e^{xyz}$
$)$. Compute the potential function for this field whose potential at the origin is -4.

. Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) -5.05152 2) -2.35152 3) 8.14848 4) 9.34848

Exercise 2

Compute the area of the domain whose boundary is the curve

$r: [0, 2\pi] \longrightarrow R^2$

$$r(t) = \left\{ \frac{\left(-\frac{\sin(t)}{\sqrt{2}} - \frac{1}{\sqrt{2}}\right) \cos(t) \, (3\cos(t)+9)}{\sin^2(t)+1}, \frac{\left(\frac{1}{\sqrt{2}} - \frac{\sin(t)}{\sqrt{2}}\right) \cos(t) \, (3\cos(t)+9)}{\sin^2(t)+1} \right\}$$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 123.926 2) 62.3257 3) 18.3257 4) 88.7257

Exercise 3

Consider the vectorial field $F(x,y,z) =$
$\left\{-9xz + 3yz + \mathrm{Cos}\left[y^2 + 2z^2\right], e^{2x^2+2z^2} - 3xyz, -8xy + \mathrm{Cos}\left[2x^2 - 2y^2\right]\right\}$ and the surface

$$S \equiv \left(\frac{7+x}{2}\right)^2 + \left(\frac{-4+y}{1}\right)^2 + \left(\frac{-1+z}{8}\right)^2 = 1$$

Compute $\int_S F.$

Indication: Use Stoke's Theorem if it is necessary.

1) 1527.85 2) -2009.75 3) 804.248 4) -2331.35

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 11

Exercise 1

Consider the vectorial field $F(x,y,z) = (2\sin(x y z) + y z\,(2x - 2y)\cos(x y z) - 3y^2 + 3$
$, -2\sin(x y z) + x z\,(2x - 2y)\cos(x y z) - 6 x y, x y\,(2x - 2y)\cos(x y z)$
). Compute the potential function for this field whose potential at the origin is -1.

. Calculate the value of the potential at the point $p = (2,3,-2)$.

1) $-\frac{541}{10} + 2\,\mathrm{Sin}[12]$ 2) $-\frac{347}{5} + 2\,\mathrm{Sin}[12]$ 3) $-49 + 2\,\mathrm{Sin}[12]$ 4) $-\frac{857}{5} + 2\,\mathrm{Sin}[12]$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r : [0, 2\pi] \dashrightarrow R^2$

$$r(t) = \left\{ \frac{\left(\frac{1}{2} - \frac{1}{2}\sqrt{3}\sin(t)\right)\cos(t)\,(3\cos(t)+8)}{\sin^2(t)+1}, \frac{\left(\frac{\sin(t)}{2} + \frac{\sqrt{3}}{2}\right)\cos(t)\,(3\cos(t)+8)}{\sin^2(t)+1} \right\}$$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 135.626 2) 121.426 3) 71.7257 4) 22.0257

Exercise 3

Consider the vectorial field $F(x,y,z) =$
$\left\{4xy + 3xz + \mathrm{Cos}\left[2y^2\right], e^{-2x^2+2z^2} - 11y, -6 - \mathrm{Sin}\left[2x^2 - 2y^2\right]\right\}$ and the surface

$$S \equiv \left(\frac{7+x}{1}\right)^2 + \left(\frac{-9+y}{9}\right)^2 + \left(\frac{-4+z}{9}\right)^2 = 1$$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 42681. 2) 17575. 3) 12553.8 4) 13809.1

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 12

Exercise 1

Consider the vectorial field $F(x,y,z)=(3x^2y^3(y-z)+2y^2, x^3y^3+3x^3y^2(y-z)+4xy, -x^3y^3)$. Compute the potential function for this field whose potential at the origin is -4.

. Calculate the value of the potential at the point $p=(-7,6,-7)$.

1) $-963\,652$ 2) $-\frac{1\,927\,304}{5}$ 3) $\frac{963\,652}{5}$ 4) $-\frac{9\,154\,694}{5}$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]\longrightarrow R^2$

$r(t)=\{(6t+5)\sin(2t)(8\cos(6t)+8), (2t+8)\sin(t)\}$

Indication: it is necessary to represent the curve to check whether it has intersection points.

1) 462.635 2) 1539.94 3) 770.435 4) 2155.54

Exercise 3

Consider the vectorial field $F(x,y,z)=\{-7-4x^2, 6xy-4yz, -7x^2\}$ and the surface

$S\equiv\left(\frac{-1+x}{4}\right)^2+\left(\frac{-2+y}{9}\right)^2+\left(\frac{9+z}{9}\right)^2=1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 87 672.4 2) 46 143.7 3) 18 457.9 4) -9227.89

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 13

Exercise 1

Consider the vectorial field $F(x,y,z) = (-z\,(2\,x\,y\,z+1)\,\sin(x\,z) + 2\,y\,z\cos(x\,z) - 2\,x$ $, 2\,x\,z\cos(x\,z), 2\,x\,y\cos(x\,z) - x\,(2\,x\,y\,z+1)\,\sin(x\,z)$). Compute the potential function for this field whose potential at the origin is 4.

. Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) 3.83264   2) −7.26736   3) 8.93264   4) 0.832636

Exercise 2

Compute the area of the domain whose boundary is the curve

$r: [0,\pi] \dashrightarrow R^2$
$r(t) = \{(8\,t+3)\,\sin(2\,t)\,(7\cos(18\,t)+9),\,(9\,t+5)\,\sin(t)\}$

Indication: it is necessary to represent the curve to check whether it has intersection points.

1) 1498.43   2) 5991.23   3) 375.225   4) 3744.83

Exercise 3

Consider the vectorial field $F(x,y,z) = \{-8\,y\,z,\ 4\,z^2,\ -6\,x^2\,y\,z - 9\,x\,y^2\,z\}$ and the surface

$$S \equiv \left(\frac{2+x}{6}\right)^2 + \left(\frac{-1+y}{4}\right)^2 + \left(\frac{7+z}{6}\right)^2 = 1$$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 5066.76   2) 0.760632   3) −13 677.4   4) 13 679.

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 14

Exercise 1

Consider the vectorial field $F(x,y,z)=(-3\,x\,y\,z^2\sin(x\,y\,z)+3\,z\cos(x\,y\,z)+3\,y^2$
$,6\,x\,y-3\,x^2\,z^2\sin(x\,y\,z),3\,x\cos(x\,y\,z)-3\,x^2\,y\,z\sin(x\,y\,z)$
). Compute the potential function for this field whose potential at the origin is -5.

. Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) −11.3806   2) 5.81944   3) −3.78056   4) −6.98056

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]\dashrightarrow R^2$
$r(t)=\{\sin(2\,t)\,(-\cos(t))\,(6\cos(t)+9),\,-(\sin(t)\sin(2\,t)\,(6\cos(t)+9))\}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 77.7544   2) 8.45442   3) 147.054   4) 16.1544

Exercise 3

Consider the vectorial field $F(x,y,z)=$
$\left\{e^{-2\,y^2-z^2}-x\,z,\ e^{-2\,x^2-2\,z^2}+8\,x\,z,\ -2\,x\,y+x\,z-\mathrm{Sin}\left[2\,x^2+y^2\right]\right\}$ and the surface

$$S\equiv\left(\frac{-6+x}{1}\right)^2+\left(\frac{8+y}{4}\right)^2+\left(\frac{-8+z}{7}\right)^2=1$$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) −681.072   2) −422.572   3) −234.572   4) 329.428

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 15

Exercise 1

Consider the vectorial field $F(x,y,z) = (6 x y^2 - y z (1 - 2 x y z) \sin(x y z) - 2 y z \cos(x y z) - 1,$ $6 x^2 y - x z (1 - 2 x y z) \sin(x y z) - 2 x z \cos(x y z), -x y (1 - 2 x y z) \sin(x y z) - 2 x y \cos(x y z)$). Compute the potential function for this field whose potential at the origin is 6.

. Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) -7.91961 2) 4.58039 3) -10.4196 4) 5.58039

Exercise 2

Compute the area of the domain whose boundary is the curve

$r: [0,\pi] \dashrightarrow R^2$
$r(t) = \{-(\sin(t) \sin(2 t) (9 \cos(t) + 9)), \sin(2 t) \cos(t) (9 \cos(t) + 9)\}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 123.926 2) 95.4259 3) 47.9259 4) 152.426

Exercise 3

Consider the vectorial field F(x,y,z) =
$\{-8 x + \mathrm{Cos}[2 y^2 - 2 z^2], 8 x z + \mathrm{Cos}[z^2], -3 y - \mathrm{Sin}[2 x^2 - y^2]\}$ and the surface

$$S \equiv \left(\frac{3 + x}{6}\right)^2 + \left(\frac{-5 + y}{5}\right)^2 + \left(\frac{2 + z}{6}\right)^2 = 1$$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 10 254.5 2) -6031.86 3) 13 270.5 4) -4825.46

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 16

Exercise 1

Consider the vectorial field $F(x,y,z) = (z\cos(yz) - 2, 3\cos(yz) - z(xz + 3y)\sin(yz), x\cos(yz) - y(xz + 3y)\sin(yz))$. Compute the potential function for this field whose potential at the origin is -4.

. Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) 11.4089   2) −3.39106   3) −14.1911   4) −0.591058

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi] \longrightarrow R^2$
$r(t) = \{(6t + 1)\sin(2t)(9\cos(20t) + 10), (2t + 8)\sin(t)(9\cos(20t) + 10)\}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 22311.7   2) 20080.6   3) 17849.5   4) 29005.

Exercise 3

Consider the vectorial field $F(x,y,z) = \{-3y^2 - 3xy^2 z, -2xyz + 6xz^2, -8y^2 z\}$ and the surface

$$S \equiv \left(\frac{9+x}{9}\right)^2 + \left(\frac{-4+y}{9}\right)^2 + \left(\frac{2+z}{2}\right)^2 = 1$$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) −252081.   2) −68129.8   3) 183951.   4) −20438.8

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 17

Exercise 1

Consider the vectorial field $F(x,y,z) = (2xy^2 + 2z\sin(xyz) + yz(2xz+2y)\cos(xyz) - y^2,\ 2x^2y + 2\sin(xyz) + xz(2xz+2y)\cos(xyz) - 2xy, 2x\sin(xyz) + xy(2xz+2y)\cos(xyz))$. Compute the potential function for this field whose potential at the origin is 1.

. Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) −0.185156 2) 1.61484 3) 1.21484 4) −0.585156

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,2\pi] \longrightarrow R^2$

$$r(t) = \left\{-\frac{\sin(t)\cos(t)(7\cos(t)+9)}{\sin^2(t)+1}, \frac{\cos(t)(7\cos(t)+9)}{\sin^2(t)+1}\right\}$$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 147.662 2) 221.462 3) 123.062 4) 73.862

Exercise 3

Consider the vectorial field F(x,y,z) =
$\{3yz + \mathrm{Sin}[y^2 + 2z^2], 7y + \mathrm{Sin}[2x^2 - 2z^2], -6xy + \mathrm{Sin}[y^2]\}$ and the surface

$$S \equiv \left(\frac{-1+x}{7}\right)^2 + \left(\frac{-4+y}{9}\right)^2 + \left(\frac{-2+z}{9}\right)^2 = 1$$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) −6649.69 2) 23 275.3 3) −13 299.7 4) 16 625.3

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 18

Exercise 1

Consider the vectorial field $F(x,y,z)=(-y\,z\,(-3\,x\,y-3)\,\sin(x\,y\,z)-3\,y\cos(x\,y\,z)+2$
$,-x\,z\,(-3\,x\,y-3)\,\sin(x\,y\,z)-3\,x\cos(x\,y\,z),-x\,y\,(-3\,x\,y-3)\,\sin(x\,y\,z)$
). Compute the potential function for this field whose potential at the origin is -1.

. Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) -1.66487 2) 2.33513 3) 0.335132 4) -0.664868

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]---\rightarrow R^2$
$r(t)=\{\sin(2\,t)\cos(t)\,(\cos(t)+1),\,\sin(t)\sin(2\,t)\,(\cos(t)+1)\}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 0.778097 2) 1.5781 3) 1.1781 4) 0.678097

Exercise 3

Consider the vectorial field $F(x,y,z)=\left\{-5+e^{-y^2}-9\,x\,y\,z,\ e^{-x^2+z^2},\ -z-\mathrm{Sin}\left[2\,x^2\right]\right\}$ and the surface

$S\equiv\left(\frac{-7+x}{9}\right)^2+\left(\frac{9+y}{7}\right)^2+\left(\frac{8+z}{5}\right)^2=1$

Compute $\int_S F.$

Indication: Use Stoke's Theorem if it is necessary.

1) 0.674484 2) -1.71267×10^6 3) 1.71267×10^6 4) $-856\,335.$

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 19

Exercise 1

Consider the vectorial field $F(x,y,z) = \left(\frac{y z (2 x y z - 3 z)}{x y z + 1} + 2 y z \log(x y z + 1) - 4 x y,\right.$ $-2 x^2 + \frac{x z (2 x y z - 3 z)}{x y z + 1} + 2 x z \log(x y z + 1), \frac{x y (2 x y z - 3 z)}{x y z + 1} + (2 x y - 3) \log(x y z + 1)$ $\left.\right)$. Compute the potential function for this field whose potential at the origin is -1.

. Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) 3.31149 2) -1.48851 3) -7.88851 4) -3.68851

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi] ----\to R^2$
$r(t) = \{(3 t + 6) \sin(2 t) (3 \cos(19 t) + 10), (8 t + 5) \sin(t)\}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 2594.86 2) 260.265 3) 4410.66 4) 4151.26

Exercise 3

Consider the vectorial field $F(x,y,z) = \{6 y^2 - 5 x z^2, -7 x^2 - 3 x^2 y z^2, 6 x - 6 y^2 z\}$ and the surface

$S \equiv \left(\frac{-6 + x}{3}\right)^2 + \left(\frac{-2 + y}{7}\right)^2 + \left(\frac{-1 + z}{8}\right)^2 = 1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 1.67186×10^6 2) -5.01559×10^6 3) -1.19419×10^6 4) -2.50779×10^6

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 20

Exercise 1

Consider the vectorial field $F(x,y,z) = (y z e^{x y z} + 6 x y, 3 x^2 + x z e^{x y z}, x y e^{x y z})$. Compute the potential function for this field whose potential at the origin is 6.

. Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) 6.6465 2) −8.3535 3) 24.6465 4) 16.8465

Exercise 2

Compute the area of the domain whose boundary is the curve

$r: [0,\pi] \longrightarrow R^2$

$r(t) = \left\{\sin(2t)\,(9\cos(t)+9)\left(\frac{\cos(t)}{\sqrt{2}} - \frac{\sin(t)}{\sqrt{2}}\right), \sin(2t)\,(9\cos(t)+9)\left(\frac{\sin(t)}{\sqrt{2}} + \frac{\cos(t)}{\sqrt{2}}\right)\right\}$

Indication: it is necessary to represent
  the curve to check whether it has intersection points.

1) 114.426 2) 95.4259 3) 28.9259 4) 66.9259

Exercise 3

Consider the vectorial field $F(x,y,z) = \left\{-12 + e^{-2 y^2 - 2 z^2}, -4 x - 9 x z + \text{Cos}\left[2 x^2 - 2 z^2\right], -5 x z - \text{Sin}\left[y^2\right]\right\}$ and the surface

$S \equiv \left(\frac{-5+x}{5}\right)^2 + \left(\frac{2+y}{4}\right)^2 + \left(\frac{-7+z}{6}\right)^2 = 1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) −33 930.3 2) −12 566.4 3) −50 267.4 4) 18 851.1

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 21

Exercise 1

Consider the vectorial field $F(x,y,z) = (4xy + y\cos(xy) + 2y, 2x^2 + x\cos(xy) + 2x, 0)$. Compute the potential function for this field whose potential at the origin is 4.

. Calculate the value of the potential at the point $p = (-6, 9, -8)$.

1) $-\frac{2992}{5} - \text{Sin}[54]$ 2) $-544 - \text{Sin}[54]$ 3) $544 - \text{Sin}[54]$ 4) $-\text{Sin}[54]$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r : [0, \pi] \dashrightarrow R^2$
$r(t) = \{(8t + 9)\sin(2t)(7\cos(14t) + 10), (2t + 6)\sin(t)\}$

Indication: it is necessary to represent the curve to check whether it has intersection points.

1) 2910.67 2) 1323.07 3) 2646.07 4) 3175.27

Exercise 3

Consider the vectorial field $F(x,y,z) = \{-4y, 2yz, -xy^2z\}$ and the surface

$S \equiv \left(\frac{2+x}{3}\right)^2 + \left(\frac{-8+y}{7}\right)^2 + \left(\frac{1+z}{3}\right)^2 = 1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 0.93479 2) −38 421.1 3) 38 422.9 4) −42 263.3

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 22

Exercise 1

Consider the vectorial field $F(x,y,z)=(z\,(2x-y)\cos(x z)+2\sin(x z)+2x, 6y-\sin(x z), x\,(2x-y)\cos(x z))$. Compute the potential function for this field whose potential at the origin is -1.

. Calculate the value of the potential at the point $p=(8,-10,-9)$.

1) $363-26\,\text{Sin}[72]$ 2) $-\frac{5127}{5}-26\,\text{Sin}[72]$ 3) $\frac{6443}{5}-26\,\text{Sin}[72]$ 4) $-\frac{2813}{5}-26\,\text{Sin}[72]$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]\text{----}\to R^2$
$r(t)=\{(5t+6)\sin(2t)(\cos(8t)+6), (5t+4)\sin(t)(\cos(8t)+6)\}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 3320.19 2) 8299.59 3) 830.494 4) 5809.89

Exercise 3

Consider the vectorial field $F(x,y,z)=\{-9\,x\,y^2\,z, -x^2\,y^2, -7\,x^2\,y\,z\}$ and the surface

$S\equiv\left(\frac{-1+x}{9}\right)^2+\left(\frac{-9+y}{3}\right)^2+\left(\frac{-8+z}{4}\right)^2=1$

Compute $\int_S F.$

Indication: Use Stoke's Theorem if it is necessary.

1) -1.1978×10^7 2) 9.64898×10^6 3) 5.32358×10^6 4) -3.32723×10^6

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 23

Exercise 1

Consider the vectorial field $F(x,y,z)=(2y^2-3,4xy,0)$. Compute the potential function for this field whose potential at the origin is -1.

. Calculate the value of the potential at the point $p=(-6,0,0)$.

1) $\frac{102}{5}$ 2) 17 3) $\frac{306}{5}$ 4) $\frac{119}{5}$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]\longrightarrow R^2$
$r(t)=\{(t+4)\sin(2t)(5\cos(8t)+5),\ (6t+3)\sin(t)(5\cos(8t)+5)\}$

Indication: it is necessary to represent the curve to check whether it has intersection points.

1) 3903.5 2) 3548.7 3) 5677.5 4) 1065.1

Exercise 3

Consider the vectorial field $F(x,y,z)=\{0,\ -3x^2z,\ -2x^2+9x^2z\}$ and the surface

$S\equiv\left(\frac{-7+x}{3}\right)^2+\left(\frac{2+y}{1}\right)^2+\left(\frac{-8+z}{4}\right)^2=1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 82 732. 2) 22 981.4 3) 32 173.8 4) 27 577.6

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 24

Exercise 1

Consider the vectorial field $F(x,y,z)=(6x,0,0)$. Compute the potential function for this field whose potential at the origin is 1.

. Calculate the value of the potential at the point $p=(6,5,7)$.

1) $\frac{2289}{10}$ 2) $-\frac{327}{10}$ 3) 109 4) $-\frac{1853}{10}$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]----\to R^2$

$r(t)=\left\{\sin(2t)\,(2\cos(t)+8)\left(-\frac{\sin(t)}{2}-\frac{1}{2}\sqrt{3}\cos(t)\right),\ \sin(2t)\,(2\cos(t)+8)\left(\frac{\cos(t)}{2}-\frac{1}{2}\sqrt{3}\sin(t)\right)\right\}$

Indication: it is necessary to represent the curve to check whether it has intersection points.

1) 87.5363 2) 77.3363 3) 51.8363 4) 41.6363

Exercise 3

Consider the vectorial field $F(x,y,z)=$ $\{-9xyz+\mathrm{Sin}[y^2+2z^2],\ 2y-\mathrm{Sin}[2z^2],\ 6+xyz+\mathrm{Cos}[2x^2-2y^2]\}$ and the surface

$S\equiv\left(\frac{6+x}{2}\right)^2+\left(\frac{y}{7}\right)^2+\left(\frac{3+z}{7}\right)^2=1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) -1395.7 2) 821.003 3) -246.297 4) 1724.1

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 25

Exercise 1

Consider the vectorial field $F(x,y,z)=(4xy^2+\frac{3yz}{xz+1}, 4x^2y+3\log(xz+1)-6y, \frac{3xy}{xz+1})$. Compute the potential function for this field whose potential at the origin is 4. . Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) −1.26464 2) 3.53536 3) 3.83536 4) −1.86464

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]\longrightarrow R^2$
$r(t)=\{(4t+1)\sin(2t)(6\cos(13t)+6), (t+8)\sin(t)(6\cos(13t)+6)\}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 8648.07 2) 5595.87 3) 5087.17 4) 6104.57

Exercise 3

Consider the vectorial field $F(x,y,z)=\{9xz, -xyz^2, 2x^2z^2\}$ and the surface

$S\equiv(\frac{9+x}{6})^2+(\frac{2+y}{6})^2+(\frac{1+z}{5})^2=1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 185 661. 2) −232 076. 3) 139 246. 4) −255 283.

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 26

Exercise 1

Consider the vectorial field $F(x,y,z)=(y z (2 y z+3) \cos(x y z)+3 y,$
$2 z \sin(x y z)+x z (2 y z+3) \cos(x y z)+3 x-1, 2 y \sin(x y z)+x y (2 y z+3) \cos(x y z)$
). Compute the potential function for this field whose potential at the origin is 2.

. Calculate the value of the potential at the point $p=(-5,-10,6)$.

1) $\frac{949}{5}-117 \text{Sin}[300]$ 2) $162-117 \text{Sin}[300]$ 3) $\frac{254}{5}-117 \text{Sin}[300]$ 4) $\frac{5814}{5}-117 \text{Sin}[300]$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]\dashrightarrow R^2$
$r(t)=\{(4 t+5) \sin(2 t) (5 \cos(18 t)+5), (8 t+7) \sin(t)\}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 2859.78 2) 1655.78 3) 1505.28 4) 2257.78

Exercise 3

Consider the vectorial field $F(x,y,z)=\{x^2 z, 5 x-9 y z, 7 x^2 z\}$ and the surface

$S\equiv\left(\frac{6+x}{1}\right)^2+\left(\frac{-5+y}{5}\right)^2+\left(\frac{4+z}{3}\right)^2=1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 21 199.5 2) 12 719.9 3) 23 319.4 4) 97 515.9

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 27

Exercise 1

Consider the vectorial field $F(x,y,z)=\left(6x+2z\log(yz+1), \frac{z(2xz+y)}{yz+1}+\log(yz+1)-1, \frac{y(2xz+y)}{yz+1}+2x\log(yz+1)\right)$. Compute the potential function for this field whose potential at the origin is -4.

. Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) -3.22741 2) -12.4274 3) 1.57259 4) -12.8274

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]\longrightarrow R^2$
$r(t)=\{(6t+7)\sin(2t)(2\cos(15t)+8), (7t+7)\sin(t)(2\cos(15t)+8)\}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 21531.3 2) 32296.5 3) 26913.9 4) 2692.17

Exercise 3

Consider the vectorial field $F(x,y,z)=\{8xyz^2, -y^2z-6xyz^2, 8x^2yz+7xz^2\}$ and the surface

$S\equiv\left(\frac{-9+x}{7}\right)^2+\left(\frac{-4+y}{7}\right)^2+\left(\frac{z}{2}\right)^2=1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 1.18553×10^6 2) $-237105.$ 3) 3.91224×10^6 4) 4.0308×10^6

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 28

Exercise 1

Consider the vectorial field $F(x,y,z) = (-6xy^2 - 2yz\cos(yz) - 3$
$, -6x^2y - z(2yz - 2xyz)\sin(yz) + (2z - 2xz)\cos(yz)$
$, (2y - 2xy)\cos(yz) - y(2yz - 2xyz)\sin(yz)$
). Compute the potential function for this field whose potential at the origin is 1.

. Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) 2.88655 2) −0.613447 3) 3.08655 4) 1.28655

Exercise 2

Compute the area of the domain whose boundary is the curve

$r: [0,\pi] \longrightarrow R^2$

$r(t) = \left\{\sin(2t)(4\cos(t) + 6)\left(\frac{(1+\sqrt{3})\cos(t)}{2\sqrt{2}} - \frac{(\sqrt{3}-1)\sin(t)}{2\sqrt{2}}\right), \sin(2t)(4\cos(t) + 6)\left(\frac{(1+\sqrt{3})\sin(t)}{2\sqrt{2}} + \frac{(\sqrt{3}-\ldots}{2\ldots}\right.\right.$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 31.1575 2) 44.7575 3) 20.9575 4) 34.5575

Exercise 3

Consider the vectorial field $F(x,y,z) =$
$\left\{7x + 4z + \mathrm{Cos}[y^2 - 2z^2], 9xyz + \mathrm{Sin}[z^2], e^{2x^2-2y^2} + 2yz\right\}$ and the surface

$S \equiv \left(\frac{3+x}{8}\right)^2 + \left(\frac{-7+y}{1}\right)^2 + \left(\frac{-3+z}{2}\right)^2 = 1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 10055.8 2) −4021.24 3) 10860.2 4) 3620.56

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 29

Exercise 1

Consider the vectorial field $F(x,y,z) = (4 x y^2 + y z^2 e^{x z} - 4 x, 4 x^2 y + z e^{x z}, y e^{x z} + x y z e^{x z})$. Compute the potential function for this field whose potential at the origin is -3.

. Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) -3.0853 2) -2.2853 3) -15.8853 4) -6.6853

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]\text{----}\to R^2$
$r(t) = \{(4 t + 8) \sin(2 t) (8 \cos(13 t) + 8), (2 t + 7) \sin(t) (8 \cos(13 t) + 8)\}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 31936.5 2) 18786.3 3) 24422.1 4) 3757.54

Exercise 3

Consider the vectorial field $F(x,y,z) = \{-7 x y^2 + 3 x z^2, 3 y z^2, -9 z^2\}$ and the surface

$$S \equiv \left(\frac{-5 + x}{2}\right)^2 + \left(\frac{3 + y}{8}\right)^2 + \left(\frac{2 + z}{2}\right)^2 = 1$$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) -9415.02 2) -11768.8 3) -49429.6 4) -22360.9

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 30

Exercise 1

Consider the vectorial field $F(x,y,z) = (6x + (3y - 3yz)\sin(yz),$
$(3x - 3xz)\sin(yz) + z(3xy - 3xyz)\cos(yz), y(3xy - 3xyz)\cos(yz) - 3xy\sin(yz)$
$)$. Compute the potential function for this field whose potential at the origin is 5.

. Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) 12.6809 2) 6.08088 3) 7.28088 4) 11.4809

Exercise 2

Compute the area of the domain whose boundary is the curve

$r: [0,\pi] \dashrightarrow R^2$

$r(t) = \left\{\sin(2t)\,(4\cos(t) + 7)\left(-\frac{\sin(t)}{\sqrt{2}} - \frac{\cos(t)}{\sqrt{2}}\right), \sin(2t)\,(4\cos(t) + 7)\left(\frac{\cos(t)}{\sqrt{2}} - \frac{\sin(t)}{\sqrt{2}}\right)\right\}$

Indication: it is necessary to represent
 the curve to check whether it has intersection points.

1) 44.7677 2) 13.9677 3) 66.7677 4) 35.9677

Exercise 3

Consider the vectorial field $F(x,y,z) =$
$\left\{-6 + 8xy + \mathrm{Sin}\left[y^2 - z^2\right], e^{-2x^2} + 2z, 3xy + \mathrm{Sin}\left[2y^2\right]\right\}$ and the surface

$S \equiv \left(\frac{-4 + x}{8}\right)^2 + \left(\frac{2 + y}{9}\right)^2 + \left(\frac{-3 + z}{1}\right)^2 = 1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) -5790.69 2) -10134.1 3) -4825.49 4) -9168.89

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 31

Exercise 1

Consider the vectorial field F(x,y,z) = $\left(-2xy-2,\ -x^2+\frac{z(-2yz-3z)}{yz+1}-2z\log(yz+1),\ \frac{y(-2yz-3z)}{yz+1}+(-2y-3)\log(yz+1)\right)$. Compute the potential function for this field whose potential at the origin is 2.

. Calculate the value of the potential at the point p = (6,1,5).

1) $-46-25\,\text{Log}[6]$ 2) $\frac{359}{10}-25\,\text{Log}[6]$ 3) $-\frac{1413}{5}-25\,\text{Log}[6]$ 4) $-\frac{2371}{10}-25\,\text{Log}[6]$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi] \longrightarrow R^2$
$r(t)=\{(3t+4)\sin(2t)(8\cos(20t)+10),\ (8t+5)\sin(t)(8\cos(20t)+10)\}$

Indication: it is necessary to represent the curve to check whether it has intersection points.

1) 13 987.2 2) 16 784.6 3) 27 974.2 4) 36 366.4

Exercise 3

Consider the vectorial field $F(x,y,z)=\{-9x^2+9x^2y^2,\ 9y,\ 5x^2y\}$ and the surface

$S \equiv \left(\frac{5+x}{3}\right)^2+\left(\frac{-4+y}{6}\right)^2+\left(\frac{2+z}{4}\right)^2=1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) -1.85959×10^6 2) $-599\,868.$ 3) -2.15953×10^6 4) $-59\,986.2$

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 32

Exercise 1

Consider the vectorial field $F(x,y,z)=(3\cos(x y z)-y z(3x+2z)\sin(x y z)$
$,-x z(3x+2z)\sin(x y z),2\cos(x y z)-x y(3x+2z)\sin(x y z)$
). Compute the potential function for this field whose potential at the origin is -3.

. Calculate the value of the potential at the point $p=(0,4,-5)$.

1) $-\frac{117}{10}$ 2) $-\frac{91}{2}$ 3) -13 4) $-\frac{533}{10}$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]\longrightarrow R^2$
$r(t)=\{(8t+3)\sin(2t)(7\cos(7t)+8),(5t+4)\sin(t)\}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 2254.8   2) 1127.8   3) 902.403   4) 1353.2

Exercise 3

Consider the vectorial field $F(x,y,z)=\{-2x^2 y z, -x^2 y^2 z, 6 x z\}$ and the surface

$S\equiv\left(\frac{-3+x}{5}\right)^2+\left(\frac{-4+y}{4}\right)^2+\left(\frac{7+z}{7}\right)^2=1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 2.73617×10^6 2) 2.33575×10^6 3) 667358.   4) 600622.

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 33

Exercise 1

Consider the vectorial field F(x,y,z)=(
$-y z(-3 x z-2 x) \sin(x y z)+(-3 z-2) \cos(x y z)-6 x y-4 x$,
$-3 x^2-x z(-3 x z-2 x) \sin(x y z)$, $-x y(-3 x z-2 x) \sin(x y z)-3 x \cos(x y z)$
). Compute the potential function for this field whose potential at the origin is 2.

. Calculate the value of the potential at the point p=(-7,10,-2).

1) $-\frac{3147}{5}-28 \operatorname{Cos}[140]$ 2) $-\frac{29684}{5}-28 \operatorname{Cos}[140]$
3) $-7810-28 \operatorname{Cos}[140]$ 4) $-1566-28 \operatorname{Cos}[140]$

Exercise 2

Compute the area of the domain whose boundary is the curve

r: $[0,2\pi] \dashrightarrow R^2$

$$r(t)=\left\{\frac{\left(\frac{1}{\sqrt{2}}-\frac{\sin(t)}{\sqrt{2}}\right)\cos(t)\,(6\cos(t)+7)}{\sin^2(t)+1},\ \frac{\left(\frac{\sin(t)}{\sqrt{2}}+\frac{1}{\sqrt{2}}\right)\cos(t)\,(6\cos(t)+7)}{\sin^2(t)+1}\right\}$$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 111.503 2) 79.9027 3) 64.1027 4) 72.0027

Exercise 3

Consider the vectorial field $F(x,y,z)=\left\{6 y+\operatorname{Cos}\left[y^2\right],\ -2+e^{-2 z^2}+5 z,\ e^{-y^2}+y z\right\}$ and the surface

$$S\equiv\left(\frac{4+x}{6}\right)^2+\left(\frac{2+y}{4}\right)^2+\left(\frac{-8+z}{1}\right)^2=1$$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) -79.8619 2) -766.662 3) -201.062 4) -1009.06

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 34

Exercise 1

Consider the vectorial field F(x,y,z) = (
$\frac{2 x y^2 z}{x y z + 1} + 2 y \log(x y z + 1) + 4 x y, \frac{2 x^2 y z}{x y z + 1} + 2 x^2 + 2 x \log(x y z + 1), \frac{2 x^2 y^2}{x y z + 1}$
). Compute the potential function for this field whose potential at the origin is −7.
. Calculate the value of the potential at the point p = (5,9,10).

1) $443 + 90 \text{Log}[451]$ 2) $-\frac{2093}{2} + 90 \text{Log}[451]$ 3) $\frac{21311}{10} + 90 \text{Log}[451]$ 4) $-\frac{34297}{10} + 90 \text{Log}[451]$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r: [0,\pi] \dashrightarrow R^2$
$r(t) = \{(7 t + 8) \sin(2 t) (\cos(2 t) + 10), (2 t + 5) \sin(t) (\cos(2 t) + 10)\}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 35 547.7 2) 13 096.9 3) 22 451.4 4) 18 709.6

Exercise 3

Consider the vectorial field $F(x,y,z) = \{-9 x y^2 z, -9 x^2 + 4 x^2 z, 5 x^2 y^2 z^2\}$ and the surface

$S \equiv \left(\frac{-6 + x}{6}\right)^2 + \left(\frac{-8 + y}{1}\right)^2 + \left(\frac{3 + z}{8}\right)^2 = 1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 4.74962×10^7 2) 8.189×10^6 3) -4.42206×10^7 4) -1.6378×10^7

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 35

Exercise 1

Consider the vectorial field $F(x,y,z) = (-2\,z\cos(x\,z) - 3\,y^2, -6\,x\,y, -2\,x\cos(x\,z))$. Compute the potential function for this field whose potential at the origin is 2.

. Calculate the value of the potential at the point $p = (8,-8,7)$.

1) $\frac{16858}{5} - 2\,\text{Sin}[56]$ 2) $3065 - 2\,\text{Sin}[56]$ 3) $-1534 - 2\,\text{Sin}[56]$ 4) $-\frac{10741}{10} - 2\,\text{Sin}[56]$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r: [0,\pi] \dashrightarrow R^2$
$r(t) = \{(4\,t + 3)\sin(2\,t)\,(9\cos(2\,t) + 9), (5\,t + 6)\sin(t)\}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 2014.74 2) 1209.14 3) 604.942 4) 403.542

Exercise 3

Consider the vectorial field $F(x,y,z) = \{2\,x^2\,y^2\,z, -6\,y\,z, 4\,x\,y^2\,z\}$ and the surface

$S \equiv \left(\frac{6+x}{3}\right)^2 + \left(\frac{4+y}{1}\right)^2 + \left(\frac{-1+z}{1}\right)^2 = 1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) -9847.01 2) 19697. 3) -6892.61 4) 21666.6

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 36

Exercise 1

Consider the vectorial field $F(x,y,z) = (y e^{xy} (2x - xyz) + e^{xy} (2 - yz) + 2y, xz(-e^{xy}) + x e^{xy} (2x - xyz) + 2x + 6y, xy(-e^{xy}))$. Compute the potential function for this field whose potential at the origin is -3.

. Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) -2.26363 2) -0.263626 3) 1.33637 4) 3.03637

Exercise 2

Compute the area of the domain whose boundary is the curve

$r: [0,\pi] \longrightarrow R^2$

$r(t) = \left\{ \sin(2t)(3\cos(t) + 5)\left(-\frac{(\sqrt{3}-1)\sin(t)}{2\sqrt{2}} - \frac{(1+\sqrt{3})\cos(t)}{2\sqrt{2}}\right), \sin(2t)(3\cos(t) + 5)\left(\frac{(\sqrt{3}-1)\cos(t)}{2\sqrt{2}} - \frac{(1+\right.\right.$

Indication: it is necessary to represent the curve to check whether it has intersection points.

1) 36.9692 2) 20.8692 3) 16.2692 4) 23.1692

Exercise 3

Consider the vectorial field $F(x,y,z) = \left\{-5y + \text{Cos}[2y^2 + 2z^2], -8xy + \text{Cos}[x^2 + 2z^2], -7 + e^{-2x^2} - 9xyz\right\}$ and the surface

$$S \equiv \left(\frac{-1+x}{8}\right)^2 + \left(\frac{4+y}{8}\right)^2 + \left(\frac{-5+z}{2}\right)^2 = 1$$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 45036.6 2) -9006.58 3) -34527. 4) 15012.6

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 37

Exercise 1

Consider the vectorial field $F(x,y,z)=(1-y(-z-3)z\sin(xyz)$
$,-x(-z-3)z\sin(xyz)-2y,-xy(-z-3)\sin(xyz)-\cos(xyz)$
). Compute the potential function for this field whose potential at the origin is -6.

. Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) 9.83485   2) −28.6652   3) 11.2348   4) −6.26515

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]\longrightarrow R^2$
$r(t)=\{(2t+1)\sin(2t)(7\cos(20t)+10),(9t+6)\sin(t)\}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 465.175   2) 1161.77   3) 1626.17   4) 2090.57

Exercise 3

Consider the vectorial field $F(x,y,z)=\{-x^2y^2, 6z^2, -3z-x^2y^2z^2\}$ and the surface

$$S\equiv\left(\frac{8+x}{6}\right)^2+\left(\frac{8+y}{3}\right)^2+\left(\frac{8+z}{8}\right)^2=1$$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 1.9241×10^8 2) -5.95555×10^7 3) -6.87179×10^7 4) 4.58119×10^7

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 38

Exercise 1

Consider the vectorial field $F(x,y,z) = (2xy^2 + y(3y - 3z)\cos(xy) + 6xy$
$,2x^2y + 3x^2 + x(3y - 3z)\cos(xy) + 3\sin(xy), -3\sin(xy)$
). Compute the potential function for this field whose potential at the origin is -2.

. Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) −7.27302 2) 5.72698 3) −1.27302 4) −2.27302

Exercise 2

Compute the area of the domain whose boundary is the curve

$r : [0,\pi] \longrightarrow R^2$
$r(t) = \{(2t + 9)\sin(2t)(4\cos(15t) + 7), (6t + 3)\sin(t)(4\cos(15t) + 7)\}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 11686.6 2) 21035.4 3) 14023.8 4) 12855.2

Exercise 3

Consider the vectorial field $F(x,y,z) = \{5x^2z - 7x^2y^2z, 2x^2 - 8x^2y, -y + 5x^2z^2\}$ and the surface

$S \equiv \left(\frac{-8 + x}{2}\right)^2 + \left(\frac{8 + y}{8}\right)^2 + \left(\frac{z}{1}\right)^2 = 1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 86860.5 2) −52115.5 3) −34743.5 4) −138976.

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 39

Exercise 1

Consider the vectorial field $F(x,y,z)=(y(-\sin(yz))-y,$
$x(-\sin(yz))+z(-xy-3z)\cos(yz)-x, y(-xy-3z)\cos(yz)-3\sin(yz)$
). Compute the potential function for this field whose potential at the origin is -3.

. Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) -1.00485 2) 10.5951 3) -0.204852 4) -3.80485

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]\text{----}\rightarrow R^2$
$r(t)=\{(t+4)\sin(2t)(9\cos(6t)+9),(6t+5)\sin(t)\}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 866.214 2) 1559.01 3) 779.614 4) 1472.41

Exercise 3

Consider the vectorial field $F(x,y,z)=$
$\{-7x^2y^2z, -2x-8x^2y^2, -8x^2y-5xy^2z^2\}$ and the surface

$$S\equiv\left(\frac{-5+x}{5}\right)^2+\left(\frac{8+y}{4}\right)^2+\left(\frac{-1+z}{8}\right)^2=1$$

Compute $\int_S F.$

Indication: Use Stoke's Theorem if it is necessary.

1) $-849286.$ 2) $-283095.$ 3) -2.83095×10^6 4) 7.36048×10^6

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 40

Exercise 1

Consider the vectorial field $F(x,y,z)=(-4xy^2+yz^2-2, xz^2-4x^2y, 2xyz)$. Compute the potential function for this field whose potential at the origin is 1.

. Calculate the value of the potential at the point $p=(-10,8,-9)$.

1) $-\frac{558511}{10}$ 2) $-\frac{346662}{5}$ 3) $\frac{211849}{5}$ 4) -19259

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]\longrightarrow R^2$

$r(t)=\{(9t+5)\sin(2t)(3\cos(4t)+5), (2t+5)\sin(t)(3\cos(4t)+5)\}$

Indication: it is necessary to represent the curve to check whether it has intersection points.

1) 2024.29 2) 6745.79 3) 2698.79 4) 1349.79

Exercise 3

Consider the vectorial field $F(x,y,z)=\{-6+x^2y, -8y^2z, -2xy^2-2z\}$ and the surface

$S\equiv\left(\frac{-8+x}{5}\right)^2+\left(\frac{7+y}{3}\right)^2+\left(\frac{8+z}{6}\right)^2=1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) -1.10421×10^6 2) $-380761.$ 3) -1.37074×10^6 4) $837677.$

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 41

Exercise 1

Consider the vectorial field F(x,y,z) = $(-y z (x z + 2 y z) \sin(x y z) + z \cos(x y z) - 2 x y,$
$-x^2 - x z (x z + 2 y z) \sin(x y z) + 2 z \cos(x y z) - 6 y, (x + 2 y) \cos(x y z) - x y (x z + 2 y z) \sin(x y z)$
). Compute the potential function for this field whose potential at the origin is -4.

. Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) 7.55277 2) 7.05277 3) 14.0528 4) -4.44723

Exercise 2

Compute the area of the domain whose boundary is the curve

r: $[0,\pi] \longrightarrow R^2$
r(t) = $\{(t + 6) \sin(2 t) (9 \cos(4 t) + 9), (3 t + 5) \sin(t) (9 \cos(4 t) + 9)\}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 1332.48 2) 11 987.7 3) 14 651.5 4) 13 319.6

Exercise 3

Consider the vectorial field F(x,y,z) = $\{-8 y z + 3 x z^2, -7 x y, -6 z^2\}$ and the surface

$$S \equiv \left(\frac{8 + x}{5}\right)^2 + \left(\frac{-3 + y}{9}\right)^2 + \left(\frac{-9 + z}{1}\right)^2 = 1$$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) -97 509.8 2) -46 948.8 3) 36 115.7 4) -50 560.3

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 42

Exercise 1

Consider the vectorial field F(x,y,z) = (
$4 x y^2 + (3 - 3 z) \sin(x y z) + y z (3 x - 3 x z) \cos(x y z) - 2 x y,$
$4 x^2 y - x^2 + x z (3 x - 3 x z) \cos(x y z), x y (3 x - 3 x z) \cos(x y z) - 3 x \sin(x y z)$
). Compute the potential function for this field whose potential at the origin is 0.

. Calculate the value of the potential at the point p = (2, -9, -10).

1) $684 + 66\,\text{Sin}[180]$ 2) $-\frac{525}{2} + 66\,\text{Sin}[180]$ 3) $\frac{27663}{10} + 66\,\text{Sin}[180]$ 4) $\frac{7206}{5} + 66\,\text{Sin}[180]$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r: [0, 2\pi] \dashrightarrow R^2$

$$r(t) = \left\{ \frac{\left(\frac{1}{\sqrt{2}} - \frac{\sin(t)}{\sqrt{2}}\right) \cos(t)\ (6 \cos(t) + 6)}{\sin^2(t) + 1},\ \frac{\left(\frac{\sin(t)}{\sqrt{2}} + \frac{1}{\sqrt{2}}\right) \cos(t)\ (6 \cos(t) + 6)}{\sin^2(t) + 1} \right\}$$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 33.9027 2) 47.1027 3) 66.9027 4) 93.3027

Exercise 3

Consider the vectorial field F(x,y,z) =
$\{x z + \text{Sin}[y^2 + 2 z^2], -9 z - \text{Sin}[2 x^2 + 2 z^2], e^{y^2} - 2 y + 6 x y z\}$ and the surface

$$S \equiv \left(\frac{4 + x}{4}\right)^2 + \left(\frac{6 + y}{8}\right)^2 + \left(\frac{8 + z}{8}\right)^2 = 1$$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) -72917.1 2) 627096. 3) 320840. 4) 145837.

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 43

Exercise 1

Consider the vectorial field $F(x,y,z)=(2y^2 z, 2xyz+z(2xy-3)+1, y(2xy-3))$. Compute the potential function for this field whose potential at the origin is -2.

. Calculate the value of the potential at the point $p=(5,-7,-7)$.

1) $-\frac{32274}{5}$ 2) $-\frac{50204}{5}$ 3) -3586 4) $-\frac{12551}{5}$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]\longrightarrow R^2$
$r(t)=\{(7t+2)\sin(2t)(\cos(15t)+7), (7t+3)\sin(t)\}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 2359.63 2) 1815.13 3) 544.627 4) 1996.63

Exercise 3

Consider the vectorial field $F(x,y,z)=\{2y^2 z, -3z+5xz, -9xy^2+8z\}$ and the surface

$S\equiv\left(\frac{3+x}{2}\right)^2+\left(\frac{7+y}{9}\right)^2+\left(\frac{8+z}{4}\right)^2=1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 1689.14 2) 6754.34 3) 4342.34 4) 2412.74

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 44

Exercise 1

Consider the vectorial field $F(x,y,z) = (3 z \sin(y z) - 3,\ z (3 x z + y) \cos(y z) + \sin(y z) - 2 y, 3 x \sin(y z) + y (3 x z + y) \cos(y z))$. Compute the potential function for this field whose potential at the origin is 0.

. Calculate the value of the potential at the point $p = (-3,1,1)$.

1) $\frac{33}{5} - 8\,\mathrm{Sin}[1]$ 2) $8 - 8\,\mathrm{Sin}[1]$ 3) $\frac{32}{5} - 8\,\mathrm{Sin}[1]$ 4) $\frac{49}{10} - 8\,\mathrm{Sin}[1]$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r : [0, \pi] \longrightarrow R^2$
$r(t) = \{(6 t + 9) \sin(2 t) (4 \cos(7 t) + 9), (9 t + 5) \sin(t) (4 \cos(7 t) + 9)\}$

Indication: it is necessary to represent the curve to check whether it has intersection points.

1) 56 180.1 2) 30 251.1 3) 73 466.1 4) 43 215.6

Exercise 3

Consider the vectorial field $F(x,y,z) = \{2 x^2 y^2 z - 7 x y z^2, z + 2 y^2 z^2, 4 x\}$ and the surface

$S \equiv \left(\frac{7 + x}{8}\right)^2 + \left(\frac{1 + y}{5}\right)^2 + \left(\frac{1 + z}{4}\right)^2 = 1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) −72 623.1 2) 121 039. 3) −48 415.3 4) −254 182.

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 45

Exercise 1

Consider the vectorial field $F(x,y,z) = (x^2 y^3 z^3 + 2 x y^2 z^2 (x y z - 3) + 6 x y^2 + y, x^3 y^2 z^3 + 2 x^2 y z^2 (x y z - 3) + 6 x^2 y + x, x^3 y^3 z^2 + 2 x^2 y^2 z (x y z - 3))$. Compute the potential function for this field whose potential at the origin is 2.

. Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) 8.88785 2) 2.08785 3) 2.48785 4) 7.28785

Exercise 2

Compute the area of the domain whose boundary is the curve

$r: [0,\pi] \longrightarrow R^2$
$r(t) = \{\sin(2t)\cos(t)(9\cos(t) + 10), \sin(t)\sin(2t)(9\cos(t) + 10)\}$

Indication: it is necessary to represent the curve to check whether it has intersection points.

1) 22.3484 2) 110.348 3) 11.3484 4) 165.348

Exercise 3

Consider the vectorial field $F(x,y,z) = \{-2y + 5yz + \mathrm{Cos}[2y^2], 6y + 2yz + \mathrm{Cos}[x^2 + 2z^2], -8xy + \mathrm{Sin}[x^2 + 2y^2]\}$ and the surface

$$S \equiv \left(\frac{-7 + x}{8}\right)^2 + \left(\frac{y}{2}\right)^2 + \left(\frac{-2 + z}{7}\right)^2 = 1$$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 4691.45 2) 15 949.8 3) 3753.25 4) 19 702.6

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 46

Exercise 1

Consider the vectorial field $F(x,y,z) = (y z e^{x z} + 3 y^2 + 1, 6 x y + e^{x z}, x y e^{x z})$. Compute the potential function for this field whose potential at the origin is 0.

. Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) 1.15895 2) 0.158951 3) 1.65895 4) 2.45895

Exercise 2

Compute the area of the domain whose boundary is the curve

$r: [0,2\pi] \dashrightarrow R^2$

$$r(t) = \left\{ \frac{\left(-\frac{(\sqrt{3}-1)\sin(t)}{2\sqrt{2}} - \frac{1+\sqrt{3}}{2\sqrt{2}}\right)\cos(t)\,(8\cos(t)+8)}{\sin^2(t)+1}, \frac{\left(\frac{\sqrt{3}-1}{2\sqrt{2}} - \frac{(1+\sqrt{3})\sin(t)}{2\sqrt{2}}\right)\cos(t)\,(8\cos(t)+8)}{\sin^2(t)+1} \right\}$$

Indication: it is necessary to represent the curve to check whether it has intersection points.

1) 83.5381 2) 189.738 3) 213.338 4) 118.938

Exercise 3

Consider the vectorial field $F(x,y,z) = \{-7 y + 4 y z + \text{Cos}[2 y^2], 6 x y - \text{Sin}[x^2 - 2 z^2], -2 + \text{Cos}[2 x^2 + 2 y^2]\}$ and the surface

$$S \equiv \left(\frac{-1+x}{8}\right)^2 + \left(\frac{-5+y}{5}\right)^2 + \left(\frac{-2+z}{6}\right)^2 = 1$$

Compute $\int_S F.$

Indication: Use Stoke's Theorem if it is necessary.

1) 6031.86 2) 10856.7 3) 3016.36 4) −3014.64

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 47

Exercise 1

Consider the vectorial field $F(x,y,z)=(0,4y,0)$. Compute the potential function for this field whose potential at the origin is -4.

. Calculate the value of the potential at the point $p=(7,-8,2)$.

1) $\frac{1984}{5}$ 2) $-\frac{682}{5}$ 3) 124 4) $-\frac{806}{5}$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]\longrightarrow R^2$
$r(t)=\{(9t+5)\sin(2t)(6\cos(10t)+6),\ (3t+1)\sin(t)\}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 353.208 2) 441.508 3) 706.408 4) 883.008

Exercise 3

Consider the vectorial field $F(x,y,z)=\{7y^2 z,\ 8-9x^2 y^2 z^2,\ -3x^2\}$ and the surface

$S\equiv\left(\frac{1+x}{5}\right)^2+\left(\frac{5+y}{6}\right)^2+\left(\frac{6+z}{2}\right)^2=1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) -6.45908×10^6 2) 4.96853×10^6 3) -5.46538×10^6 4) 1.58993×10^7

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 48

Exercise 1

Consider the vectorial field $F(x,y,z) = (y^3 z^4, 3 y^2 z^3 (x z - 1) + 4 y - 1, x y^3 z^3 + 3 y^3 z^2 (x z - 1)$). Compute the potential function for this field whose potential at the origin is 1.

. Calculate the value of the potential at the point $p = (3,2,4)$.

1) $\frac{28195}{2}$ 2) $-\frac{5639}{10}$ 3) 5639 4) $\frac{95863}{5}$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r: [0,2\pi] ----\rightarrow R^2$

$$r(t) = \left\{ \frac{\left(\frac{1+\sqrt{3}}{2\sqrt{2}} - \frac{(\sqrt{3}-1)\sin(t)}{2\sqrt{2}}\right)\cos(t)\,(9\cos(t)+10)}{\sin^2(t)+1}, \frac{\left(\frac{(1+\sqrt{3})\sin(t)}{2\sqrt{2}} + \frac{\sqrt{3}-1}{2\sqrt{2}}\right)\cos(t)\,(9\cos(t)+10)}{\sin^2(t)+1} \right\}$$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 304.731 2) 169.531 3) 203.331 4) 287.831

Exercise 3

Consider the vectorial field $F(x,y,z) =$
$\left\{e^{-2 z^2} + 3 y z, -7 x y - 5 x z - \mathrm{Sin}\left[2 x^2 + z^2\right], 8 y + \mathrm{Sin}\left[2 x^2 + y^2\right]\right\}$ and the surface

$$S \equiv \left(\frac{1 + x}{7}\right)^2 + \left(\frac{-8 + y}{2}\right)^2 + \left(\frac{1 + z}{3}\right)^2 = 1$$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) -122.596 2) 1231.5 3) 3078. 4) 4185.9

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 49

Exercise 1

Consider the vectorial field $F(x,y,z) = (2xy^2 - yz(xyz+x)\sin(xyz) + (yz+1)\cos(xyz) - 2y^2, 2x^2 y - xz(xyz+x)\sin(xyz) + xz\cos(xyz) - 4xy, xy\cos(xyz) - xy(xyz+x)\sin(xyz))$. Compute the potential function for this field whose potential at the origin is 3.

. Calculate the value of the potential at the point $p=(-9,-6,-4)$.

1) $3567 - 225\,\mathrm{Cos}[216]$ 2) $16615 - 225\,\mathrm{Cos}[216]$

3) $14751 - 225\,\mathrm{Cos}[216]$ 4) $-\frac{2669}{5} - 225\,\mathrm{Cos}[216]$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi] \text{----}\to R^2$

$r(t) = \left\{\sin(2t)(\cos(t)+6)\left(-\frac{(1+\sqrt{3})\sin(t)}{2\sqrt{2}} - \frac{(\sqrt{3}-1)\cos(t)}{2\sqrt{2}}\right), \sin(2t)(\cos(t)+6)\left(\frac{(1+\sqrt{3})\cos(t)}{2\sqrt{2}} - \frac{(\sqrt{3}-1)\,\text{:}}{2\sqrt{\text{:}}}\right.\right.$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 51.067 2) 9.06703 3) 17.467 4) 28.667

Exercise 3

Consider the vectorial field $F(x,y,z) = \left\{-2 + e^{-y^2+2z^2}, 8xy - 7xyz + \mathrm{Cos}[2x^2], -xyz + \mathrm{Cos}[2x^2]\right\}$ and the surface

$S \equiv \left(\frac{-9+x}{7}\right)^2 + \left(\frac{8+y}{9}\right)^2 + \left(\frac{-2+z}{7}\right)^2 = 1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) -3324.38 2) 33250.6 3) 149626. 4) 133001.

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 50

Exercise 1

Consider the vectorial field $F(x,y,z)=(2xy^2z^2(-xy-3y)-x^2y^3z^2, (-x-3)x^2y^2z^2+2x^2yz^2(-xy-3y), 2x^2y^2z(-xy-3y))$. Compute the potential function for this field whose potential at the origin is -3.

. Calculate the value of the potential at the point $p=(5,-1,-9)$.

1) $-\frac{372531}{10}$ 2) $\frac{437319}{10}$ 3) 16197 4) $\frac{664077}{10}$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]\longrightarrow R^2$
$r(t)=\{(7t+1)\sin(2t)(9\cos(4t)+10),(6t+4)\sin(t)(9\cos(4t)+10)\}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 54618.2 2) 13655. 3) 58031.8 4) 34136.6

Exercise 3

Consider the vectorial field $F(x,y,z)=\{xz^2-7xyz^2, 4x^2z^2, 6xy^2-9x^2y^2z\}$ and the surface

$S\equiv\left(\frac{8+x}{5}\right)^2+\left(\frac{y}{5}\right)^2+\left(\frac{z}{3}\right)^2=1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) -3.91429×10^6 2) $-954703.$ 3) 2.19582×10^6 4) -2.5777×10^6

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 51

Exercise 1

Consider the vectorial field $F(x,y,z)=((-2yz-3)\sin(xz)+z(-2xyz-3x)\cos(xz)$
$,-2xz\sin(xz)-4y, x(-2xyz-3x)\cos(xz)-2xy\sin(xz)$
). Compute the potential function for this field whose potential at the origin is 1.

. Calculate the value of the potential at the point $p=(2,-4,5)$.

1) $-31+74\,\text{Sin}[10]$ 2) $\frac{529}{5}+74\,\text{Sin}[10]$ 3) $\frac{637}{5}+74\,\text{Sin}[10]$ 4) $\frac{1033}{5}+74\,\text{Sin}[10]$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]----\to R^2$

$r(t)=\left\{\sin(2t)\,(3\cos(t)+3)\left(\frac{(\sqrt{3}-1)\cos(t)}{2\sqrt{2}}-\frac{(1+\sqrt{3})\sin(t)}{2\sqrt{2}}\right),\ \sin(2t)\,(3\cos(t)+3)\left(\frac{(\sqrt{3}-1)\sin(t)}{2\sqrt{2}}+\frac{(1+\sqrt{3}}{2}\right.\right.$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 10.6029 2) 4.60288 3) 9.60288 4) 5.60288

Exercise 3

Consider the vectorial field $F(x,y,z)=$
$\left\{e^{-2y^2+z^2}-6yz,\ -4y+\text{Cos}\left[x^2+2z^2\right],\ e^{x^2-2y^2}+5z\right\}$ and the surface

$S\equiv\left(\frac{5+x}{3}\right)^2+\left(\frac{7+y}{1}\right)^2+\left(\frac{-7+z}{3}\right)^2=1$

Compute $\int_S F.$

Indication: Use Stoke's Theorem if it is necessary.

1) -84.4009 2) -43.7009 3) -32.6009 4) 37.6991

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 52

Exercise 1

Consider the vectorial field $F(x,y,z) = (\frac{z\,(3x - 3xyz)}{xz+1} + (3 - 3yz)\log(xz+1) - 2xy - 4x$

$, -x^2 - 3xz\log(xz+1), \frac{x\,(3x - 3xyz)}{xz+1} - 3xy\log(xz+1)$

). Compute the potential function for this field whose potential at the origin is -5.

. Calculate the value of the potential at the point $p=(-2,-5,0)$.

1) $\frac{63}{10}$ 2) 7 3) $\frac{91}{5}$ 4) $-\frac{133}{10}$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r: [0,\pi] \dashrightarrow R^2$

$r(t) = \left\{\sin(2t)\,(2\cos(t)+4)\left(\frac{\cos(t)}{2} - \frac{1}{2}\sqrt{3}\sin(t)\right), \sin(2t)\,(2\cos(t)+4)\left(\frac{\sin(t)}{2} + \frac{1}{2}\sqrt{3}\cos(t)\right)\right\}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 12.7372 2) 18.3372 3) 14.1372 4) 15.5372

Exercise 3

Consider the vectorial field $F(x,y,z) =$
$\left\{-1 + e^{2y^2}, -5xz - \mathrm{Sin}\left[x^2 - 2z^2\right], -9 + 5yz + \mathrm{Cos}\left[y^2\right]\right\}$ and the surface

$S \equiv (\frac{6+x}{7})^2 + (\frac{-9+y}{2})^2 + (\frac{3+z}{2})^2 = 1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) $-10\,025.4$ 2) $13\,721.1$ 3) 5277.88 4) 4750.18

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 53

Exercise 1

Consider the vectorial field $F(x,y,z) = (-y z\,(x - x y z)\sin(x y z) + (1 - y z)\cos(x y z) + 3$ $, -x z\,(x - x y z)\sin(x y z) - x z\cos(x y z), -x y\,(x - x y z)\sin(x y z) - x y\cos(x y z)$ $)$. Compute the potential function for this field whose potential at the origin is -4.

. Calculate the value of the potential at the point $p=(3,5,9)$.

1) $549 - 132\,\mathrm{Cos}[135]$ 2) $-\frac{2423}{5} - 132\,\mathrm{Cos}[135]$ 3) $-\frac{247}{5} - 132\,\mathrm{Cos}[135]$ 4) $5 - 132\,\mathrm{Cos}[135]$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r : [0, 2\pi] \dashrightarrow R^2$

$$r(t) = \left\{ \frac{\left(\frac{\sqrt{3}}{2} - \frac{\sin(t)}{2}\right)\cos(t)\,(8\cos(t) + 10)}{\sin^2(t) + 1}, \frac{\left(\frac{1}{2}\sqrt{3}\sin(t) + \frac{1}{2}\right)\cos(t)\,(8\cos(t) + 10)}{\sin^2(t) + 1} \right\}$$

Indication: it is necessary to represent
 the curve to check whether it has intersection points.

1) 154.938 2) 16.3381 3) 170.338 4) 47.1381

Exercise 3

Consider the vectorial field $F(x,y,z) =$
$\left\{4x + 6z + \mathrm{Sin}\left[y^2 - 2z^2\right], 9xyz + \mathrm{Cos}\left[z^2\right], e^{-2x^2+y^2} - 3y + 9z\right\}$ and the surface

$$S \equiv \left(\frac{2 + x}{1}\right)^2 + \left(\frac{-8 + y}{6}\right)^2 + \left(\frac{8 + z}{4}\right)^2 = 1$$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 9470.16 2) 15 783.4 3) −41 035.4 4) 78 915.4

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 54

Exercise 1

Consider the vectorial field $F(x,y,z)=\left(\frac{y(-3xz-z)}{xy+1}-3z\log(xy+1), \frac{x(-3xz-z)}{xy+1}+3, (-3x-1)\log(xy+1)\right)$. Compute the potential function for this field whose potential at the origin is 0.

. Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) 1.19118 2) -1.60882 3) 2.59118 4) 1.59118

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]\dashrightarrow R^2$
$r(t)=\{(6t+8)\sin(2t)(\cos(15t)+9), (5t+6)\sin(t)\}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 5382. 2) 2990. 3) 4186. 4) 1794.

Exercise 3

Consider the vectorial field $F(x,y,z)=\{-3y, -2y^2z+5xy^2z^2, 8xyz^2\}$ and the surface

$S\equiv\left(\frac{-4+x}{2}\right)^2+\left(\frac{-2+y}{5}\right)^2+\left(\frac{-8+z}{3}\right)^2=1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 1.09498×10^6 2) -1.40783×10^6 3) 782131. 4) 1.87711×10^6

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 55

Exercise 1

Consider the vectorial field F(x,y,z) = ($z\,(2\,x\,z + y\,z) + 2\,x\,z^2 - 2, x\,z^2 + 4\,y, x\,z\,(2\,x + y) + x\,(2\,x\,z + y\,z)$). Compute the potential function for this field whose potential at the origin is 1.

. Calculate the value of the potential at the point p=(7,2,7).

1) $-\frac{5483}{2}$ 2) $-\frac{10\,966}{5}$ 3) 5483 4) $-\frac{49\,347}{10}$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,2\pi] \dashrightarrow R^2$

$r(t) = \left\{-\frac{\cos(t)\,(4\cos(t)+7)}{\sin^2(t)+1}, -\frac{\sin(t)\cos(t)\,(4\cos(t)+7)}{\sin^2(t)+1}\right\}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 44.1345 2) 62.7345 3) 75.1345 4) 25.5345

Exercise 3

Consider the vectorial field F(x,y,z) =
$\left\{e^{y^2+z^2} + 2\,y\,z, 7\,z + \mathrm{Sin}\left[2\,x^2 + z^2\right], -9\,x\,y + \mathrm{Sin}\left[x^2 + y^2\right]\right\}$ and the surface

$S \equiv \left(\frac{-2+x}{7}\right)^2 + \left(\frac{-4+y}{2}\right)^2 + \left(\frac{1+z}{6}\right)^2 = 1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 0. 2) -1.9 3) -1.5 4) -1.4

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 56

Exercise 1

Consider the vectorial field $F(x,y,z)=(x y^2 z^2 (-e^{x y z}) - y z e^{x y z} - 6 x + 3 y$
$, x^2 y z^2 (-e^{x y z}) - x z e^{x y z} + 3 x, x^2 y^2 z (-e^{x y z}) - x y e^{x y z}$
). Compute the potential function for this field whose potential at the origin is 0.

. Calculate the value of the potential at the point $p=(3,1,-1)$.

1) $-\frac{108}{5}+\frac{3}{e^3}$ 2) $-\frac{234}{5}+\frac{3}{e^3}$ 3) $\frac{207}{5}+\frac{3}{e^3}$ 4) $-18+\frac{3}{e^3}$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]----\to R^2$

$r(t)=\left\{\sin(2t)\,(5\cos(t)+8)\left(\frac{(1+\sqrt{3})\cos(t)}{2\sqrt{2}}-\frac{(\sqrt{3}-1)\sin(t)}{2\sqrt{2}}\right), \sin(2t)\,(5\cos(t)+8)\left(\frac{(1+\sqrt{3})\sin(t)}{2\sqrt{2}}+\frac{(\sqrt{3}-\right.\right.$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 90.083 2) 18.083 3) 60.083 4) 114.083

Exercise 3

Consider the vectorial field $F(x,y,z)=$
$\{\text{Cos}[y^2+z^2], -2y-\text{Sin}[x^2-z^2], -2-\text{Sin}[2x^2-2y^2]\}$ and the surface

$S\equiv\left(\frac{-5+x}{6}\right)^2+\left(\frac{3+y}{8}\right)^2+\left(\frac{4+z}{6}\right)^2=1$

Compute $\int_S F.$

Indication: Use Stoke's Theorem if it is necessary.

1) -2412.74 2) -2895.34 3) 5550.16 4) -6273.54

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 57

Exercise 1

Consider the vectorial field $F(x,y,z)=(y z (3 y z+2) \cos(x y z),$
$3 z \sin(x y z)+x z (3 y z+2) \cos(x y z)-6 y, 3 y \sin(x y z)+x y (3 y z+2) \cos(x y z)$
). Compute the potential function for this field whose potential at the origin is 6.

. Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) 11.9066   2) 5.40662   3) −14.5934   4) 22.9066

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi] \dashrightarrow R^2$
$r(t)=\{(4 t+9) \sin(2 t) (8 \cos(2 t)+9), (3 t+1) \sin(t)\}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 1192.22   2) 265.424   3) 1324.62   4) 1854.22

Exercise 3

Consider the vectorial field $F(x,y,z)=\{4-7 x z^2, -3 y, 4 x y^2 z-6 x^2 y z^2\}$ and the surface

$$S\equiv \left(\frac{6+x}{1}\right)^2+\left(\frac{6+y}{4}\right)^2+\left(\frac{z}{1}\right)^2=1$$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) −71 266.5   2) −36 425.1   3) −15 837.   4) 47 511.

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 58

Exercise 1

Consider the vectorial field $F(x,y,z)=(-y z e^{x y z}-4 x y+2 y,-2 x^2-x z e^{x y z}+2 x,x y(-e^{x y z}))$. Compute the potential function for this field whose potential at the origin is -2.

. Calculate the value of the potential at the point $p=(-5,5,1)$.

1) $-\frac{6488}{5}-\frac{1}{e^{25}}$ 2) $-301-\frac{1}{e^{25}}$ 3) $-\frac{3921}{5}-\frac{1}{e^{25}}$ 4) $-\frac{4978}{5}-\frac{1}{e^{25}}$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]\longrightarrow R^2$

$r(t)=\{(9t+7)\sin(2t)(6\cos(13t)+8),(3t+7)\sin(t)(6\cos(13t)+8)\}$

Indication: it is necessary to represent the curve to check whether it has intersection points.

1) 5556.65 2) 27779.8 3) 13890.3 4) 44447.2

Exercise 3

Consider the vectorial field $F(x,y,z)=\{9x^2z^2-6yz^2, 9x^2yz^2, -6x^2z^2\}$ and the surface

$S\equiv\left(\frac{-4+x}{5}\right)^2+\left(\frac{2+y}{5}\right)^2+\left(\frac{4+z}{8}\right)^2=1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 2.31127×10^7 2) 7.00385×10^6 3) 1.821×10^7 4) 3.01165×10^7

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 59

Exercise 1

Consider the vectorial field $F(x,y,z)=(y\,z\,(3\,y\,z-3\,z)\,e^{x\,y\,z}-6\,x\,y-2\,y$ $,-3\,x^2+x\,z\,(3\,y\,z-3\,z)\,e^{x\,y\,z}+3\,z\,e^{x\,y\,z}-2\,x,(3\,y-3)\,e^{x\,y\,z}+x\,y\,(3\,y\,z-3\,z)\,e^{x\,y\,z}$ $)$. Compute the potential function for this field whose potential at the origin is -2.

. Calculate the value of the potential at the point $p=(-5,7,3)$.

1) $-457+\frac{54}{e^{105}}$ 2) $-\frac{457}{2}+\frac{54}{e^{105}}$ 3) $-\frac{5027}{10}+\frac{54}{e^{105}}$ 4) $\frac{914}{5}+\frac{54}{e^{105}}$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]\longrightarrow R^2$
$r(t)=\{(2\,t+8)\sin(2\,t)\,(5\cos(11\,t)+5),\ (7\,t+3)\sin(t)\,(5\cos(11\,t)+5)\}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 5572.97 2) 15 125. 3) 11 145. 4) 7960.97

Exercise 3

Consider the vectorial field $F(x,y,z)=\{-9\,y\,z,\ -2\,x\,z,\ 2\,x^2\,z^2\}$ and the surface

$S\equiv\left(\frac{2+x}{3}\right)^2+\left(\frac{y}{6}\right)^2+\left(\frac{9+z}{8}\right)^2=1$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 50 379.2 2) −125 945. 3) −138 540. 4) −62 972.2

Further Mathematics - Grado en Ingeniería - 2023/2024
04-Line-surface integral-Test 1 for serial number: 60

Exercise 1

Consider the vectorial field $F(x,y,z)=(-y\,z\,(-2\,y\,z-y)\,\sin(x\,y\,z)-2\,y^2,$
$-x\,z\,(-2\,y\,z-y)\,\sin(x\,y\,z)+(-2\,z-1)\,\cos(x\,y\,z)-4\,x\,y, -x\,y\,(-2\,y\,z-y)\,\sin(x\,y\,z)-2\,y\cos(x\,y\,z)$
$)$. Compute the potential function for this field whose potential at the origin is -3.

. Calculate the integral of the potential function ϕ over the domain $[0,1]^3$.

1) -12.2993 2) 14.7007 3) -4.29934 4) -7.79934

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]\longrightarrow R^2$
$r(t)=\{(3\,t+9)\,\sin(2\,t)\,(\cos(18\,t)+5),\ (7\,t+3)\,\sin(t)\,(\cos(18\,t)+5)\}$

Indication: it is necessary to represent
the curve to check whether it has intersection points.

1) 670.378 2) 2680.38 3) 6700.38 4) $10\,050.4$

Exercise 3

Consider the vectorial field $F(x,y,z)=\{-7\,x\,y^2\,z^2,\ -x^2\,y+3\,y\,z^2,\ 4\,y+7\,y^2\,z\}$ and the surface

$$S\equiv\left(\frac{4+x}{1}\right)^2+\left(\frac{8+y}{7}\right)^2+\left(\frac{-8+z}{5}\right)^2=1$$

Compute $\int_S F$.

Indication: Use Stoke's Theorem if it is necessary.

1) 1.43019×10^7 2) -8.68328×10^6 3) -5.10781×10^6 4) -1.32803×10^7