Further Mathematics - Grado en Ingeniería - 2019/2020
04-Line-surface integral-Test 1 for serial number: 1

Exercise 1

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

. Calculate the value of the potential at the point $p=(1,-7,2)$.

1) $\frac{97}{5}-43\,\mathrm{Cos}[14]$ 2) $20-43\,\mathrm{Cos}[14]$ 3) $\frac{173}{10}-43\,\mathrm{Cos}[14]$ 4) $23-43\,\mathrm{Cos}[14]$

Exercise 2

Compute the area of the domain whose boundary is the curve

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

$$r(t)=\left\{\frac{\left(-\frac{(1+\sqrt{3})\sin(t)}{2\sqrt{2}}-\frac{\sqrt{3}-1}{2\sqrt{2}}\right)\cos(t)\,(8\cos(t)+9)}{\sin^2(t)+1},\frac{\left(\frac{1+\sqrt{3}}{2\sqrt{2}}-\frac{(\sqrt{3}-1)\sin(t)}{2\sqrt{2}}\right)\cos(t)\,(8\cos(t)+9)}{\sin^2(t)+1}\right\}$$

$$\left\{\frac{\mathrm{Cos}[t]\,(9+8\,\mathrm{Cos}[t])\left(-\frac{-1+\sqrt{3}}{2\sqrt{2}}-\frac{(1+\sqrt{3})\,\mathrm{Sin}[t]}{2\sqrt{2}}\right)}{1+\mathrm{Sin}[t]^2},\frac{\mathrm{Cos}[t]\,(9+8\,\mathrm{Cos}[t])\left(\frac{1+\sqrt{3}}{2\sqrt{2}}-\frac{(-1+\sqrt{3})\,\mathrm{Sin}[t]}{2\sqrt{2}}\right)}{1+\mathrm{Sin}[t]^2}\right\}$$

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

1) 135.338 2) 135.938 3) 133.238 4) 138.938

Exercise 3

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

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

Compute $\int_S F.$

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

1) 640.285 2) 640.885 3) 638.185 4) 643.885

Further Mathematics - Grado en Ingeniería - 2019/2020
04-Line-surface integral-Test 1 for serial number: 2

Exercise 1

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

. Calculate the value of the potential at the point p=(-6,8,3).

1) $283 - 24 \text{Sin}[144]$ 2) $\frac{9059}{5} - 24 \text{Sin}[144]$ 3) $-\frac{7111}{5} - 24 \text{Sin}[144]$ 4) $577 - 24 \text{Sin}[144]$

Exercise 2

Compute the area of the domain whose boundary is the curve

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

$r(t) = \{(3t+4)\sin(2t)(3\cos(5t)+9), (7t+4)\sin(t)(3\cos(5t)+9)\}$

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

1) 13680.9   2) 19760.9   3) 15200.9   4) 25840.9

Exercise 3

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

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

Compute $\int_S F$.

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

1) -9.07097×10^7 2) 1.17167×10^8 3) 3.77957×10^7 4) 1.88978×10^7

Further Mathematics - Grado en Ingeniería - 2019/2020
04-Line-surface integral-Test 1 for serial number: 3

Exercise 1

Consider the vectorial field $F(x,y,z)=(-6xy^2+y e^{xy}(x+yz)+e^{xy},-6x^2y+x e^{xy}(x+yz)+z e^{xy},y e^{xy})$. 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) 1.74409 2) -1.55591 3) 1.94409 4) 3.44409

Exercise 2

Compute the area of the domain whose boundary is the curve

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

$$r(t)=\left\{\frac{\left(-\frac{1}{2}\sqrt{3}\sin(t)-\frac{1}{2}\right)\cos(t)\,(4\cos(t)+8)}{\sin^2(t)+1},\ \frac{\left(\frac{\sqrt{3}}{2}-\frac{\sin(t)}{2}\right)\cos(t)\,(4\cos(t)+8)}{\sin^2(t)+1}\right\}$$

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

1) 116.235 2) 77.7345 3) 85.4345 4) 131.635

Exercise 3

Consider the vectorial field $F(x,y,z)=$
$\left\{e^{2y^2-2z^2}+2xz,\ -9x+8xz-\mathrm{Sin}\left[2x^2-z^2\right],\ 4+y+\mathrm{Cos}\left[2x^2-2y^2\right]\right\}$ and the surface

$$S\equiv\left(\frac{6+x}{6}\right)^2+\left(\frac{-9+y}{4}\right)^2+\left(\frac{3+z}{4}\right)^2=1$$

Compute $\int_S F.$

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

1) 5550.16 2) -2412.74 3) -2895.34 4) -6514.84

Further Mathematics - Grado en Ingeniería - 2019/2020
04-Line-surface integral-Test 1 for serial number: 4

Exercise 1

Consider the vectorial field $F(x,y,z) = (2xy, x^2, 0)$. 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) 4.16667   2) −4.63333   3) −7.03333   4) 17.7667

Exercise 2

Compute the area of the domain whose boundary is the curve

$r: [0,\pi] \longrightarrow R^2$
$r(t) = \{(4t+7)\sin(2t)(2\cos(17t)+8), (9t+8)\sin(t)(2\cos(17t)+8)\}$

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

1) 15991.4   2) 10661.2   3) 5330.96   4) 26651.8

Exercise 3

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

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

Compute $\int_S F$.

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

1) -6.83304×10^6 2) 1.86356×10^6 3) -1.55296×10^6 4) 2.79533×10^6

Further Mathematics - Grado en Ingeniería - 2019/2020
04-Line-surface integral-Test 1 for serial number: 5

Exercise 1

Consider the vectorial field F(x,y,z)=($-2xyz+yz(3z-2x)-2y^2+2y,-4xy+xz(3z-2x)+2x,3xyz+xy(3z-2x)$). 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) -2.65 2) 5.15 3) 1.25 4) -1.75

Exercise 2

Compute the area of the domain whose boundary is the curve

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

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

1) 4154.23 2) 4984.93 3) 2769.73 4) 277.632

Exercise 3

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

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

Compute $\int_S F$.

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

1) -142070. 2) 412007. 3) 284143. 4) -696147.

Further Mathematics - Grado en Ingeniería - 2019/2020
04-Line-surface integral-Test 1 for serial number: 6

Exercise 1

Consider the vectorial field $F(x,y,z)=(2-2y^2, 1-4xy, 0)$. Compute the potential function for this field whose potential at the origin is -5.

. Calculate the value of the potential at the point $p=(6,-4,0)$.

1) $\frac{3969}{10}$ 2) $-\frac{3024}{5}$ 3) -189 4) $-\frac{567}{10}$

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]\longrightarrow R^2$
$r(t)=\{(4t+3)\sin(2t)(4\cos(19t)+10), (5t+3)\sin(t)(4\cos(19t)+10)\}$

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

1) 7607.42 2) 28907. 3) 4564.62 4) 15214.4

Exercise 3

Consider the vectorial field $F(x,y,z)=\{1, -8x, 3x^2y^2-3z^2\}$ and the surface

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

Compute $\int_S F$.

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

1) -9497.41 2) 14474.5 3) 1357.79 4) 4523.89

Further Mathematics - Grado en Ingeniería - 2019/2020
04-Line-surface integral-Test 1 for serial number: 7

Exercise 1

Consider the vectorial field $F(x,y,z) = (6 x^2 y^3 z^3 + 2 x y, 6 x^3 y^2 z^3 + x^2, 6 x^3 y^3 z^2)$. 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) 3.19792 2) 7.99792 3) 5.59792 4) −3.40208

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi] \dashrightarrow R^2$
$r(t) = \{(8 t + 4) \sin(2 t) (2 \cos(20 t) + 10), (7 t + 5) \sin(t)\}$

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

1) 5191.28 2) 4820.48 3) 2224.88 4) 3708.08

Exercise 3

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

$S \equiv \left(\frac{2 + x}{4}\right)^2 + \left(\frac{-3 + y}{2}\right)^2 + \left(\frac{-9 + z}{5}\right)^2 = 1$

Compute $\int_S F$.

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

1) 37397.2 2) 20776.4 3) 54018. 4) −24930.8

Further Mathematics - Grado en Ingeniería - 2019/2020
04-Line-surface integral-Test 1 for serial number: 8

Exercise 1

Consider the vectorial field $F(x,y,z) = \left(\frac{y z (3 x z - 2 x)}{x y z + 1} + (3 z - 2) \log(x y z + 1) + 2 x y + y^2, x^2 + \frac{x z (3 x z - 2 x)}{x y z + 1} + 2 x y, \frac{x y (3 x z - 2 x)}{x y z + 1} + 3 x \log(x y z + 1)\right)$. 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) 3.93098 2) −11.269 3) 7.13098 4) −3.66902

Exercise 2

Compute the area of the domain whose boundary is the curve

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

$$r(t) = \left\{ \frac{\left(\frac{1}{2} - \frac{1}{2}\sqrt{3}\sin(t)\right)\cos(t)\,(6\cos(t)+9)}{\sin^2(t)+1}, \frac{\left(\frac{\sin(t)}{2} + \frac{\sqrt{3}}{2}\right)\cos(t)\,(6\cos(t)+9)}{\sin^2(t)+1} \right\}$$

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

1) 123.003 2) 167.403 3) 23.1027 4) 111.903

Exercise 3

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

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

Compute $\int_S F$.

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

1) 7464.42 2) −12688.4 3) 21646. 4) −6717.18

Further Mathematics - Grado en Ingeniería - 2019/2020
04-Line-surface integral-Test 1 for serial number: 9

Exercise 1

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

. Calculate the value of the potential at the point $p=(7,7,-9)$.

1) −19 440   2) 5760   3) 14 400   4) −7200

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]\longrightarrow R^2$
$r(t)=\{(3t+8)\sin(2t)(7\cos(8t)+7),(2t+6)\sin(t)(7\cos(8t)+7)\}$

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

1) 10 419.5   2) 11 577.2   3) 13 892.6   4) 17 365.7

Exercise 3

Consider the vectorial field $F(x,y,z)=\{-4y^2-yz^2,5xy^2,9y+7xyz\}$ and the surface

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

Compute $\int_S F$.

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

1) 20 509.4   2) −69 216.6   3) −25 635.4   4) 51 272.6

Further Mathematics - Grado en Ingeniería - 2019/2020
04-Line-surface integral-Test 1 for serial number: 10

Exercise 1

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

. Calculate the value of the potential at the point p=(−9,−8,−4).

1) $-\frac{174}{5}-82\,\text{Log}[37]$ 2) $60-82\,\text{Log}[37]$ 3) $-\frac{2007}{10}-82\,\text{Log}[37]$ 4) $-\frac{3492}{5}-82\,\text{Log}[37]$

Exercise 2

Compute the area of the domain whose boundary is the curve

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

$r(t)=\{(4t+7)\sin(2t)(8\cos(6t)+9), (5t+2)\sin(t)(8\cos(6t)+9)\}$

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

1) 16 611. 2) 8305.82 3) 20 763.6 4) 24 916.2

Exercise 3

Consider the vectorial field $F(x,y,z)=\{-6x^2y, 4z^2-5x^2y^2z^2, -7x\}$ and the surface

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

Compute $\int_S F.$

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

1) -1.23694×10^8 2) -6.18471×10^7 3) -4.12314×10^7 4) -2.9451×10^7

Further Mathematics - Grado en Ingeniería - 2019/2020
04-Line-surface integral-Test 1 for serial number: 11

Exercise 1

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

. Calculate the value of the potential at the point $p=(-7,-7,9)$.

1) $\frac{1204}{5} + 119\,\mathrm{Sin}[441]$ 2) $-3 + 119\,\mathrm{Sin}[441]$ 3) $50 + 119\,\mathrm{Sin}[441]$ 4) $-\frac{1923}{5} + 119\,\mathrm{Sin}[441]$

Exercise 2

Compute the area of the domain whose boundary is the curve

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

$r(t) = \left\{\sin(2t)\,(5\cos(t)+10)\left(\frac{(1+\sqrt{3})\cos(t)}{2\sqrt{2}} - \frac{(\sqrt{3}-1)\sin(t)}{2\sqrt{2}}\right), \sin(2t)\,(5\cos(t)+10)\left(\frac{(1+\sqrt{3})\sin(t)}{2\sqrt{2}} + \frac{(\sqrt{\cdots}\right.\right.$

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

1) 167.557 2) 88.3573 3) 17.9573 4) 26.7573

Exercise 3

Consider the vectorial field $F(x,y,z) =$
$\{-4x - \mathrm{Sin}[2y^2 - z^2], e^{-2x^2+2z^2} - 8z, xz + \mathrm{Cos}[x^2 - 2y^2]\}$ and the surface

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

Compute $\int_S F.$

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

1) 201.041 2) -348.359 3) 442.241 4) 134.041

Further Mathematics - Grado en Ingeniería - 2019/2020
04-Line-surface integral-Test 1 for serial number: 12

Exercise 1

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

. Calculate the value of the potential at the point p = (1, −7, −5).

1) $-3+10\,\mathrm{Sin}[5]$ 2) $\frac{102}{5}+10\,\mathrm{Sin}[5]$ 3) $-\frac{407}{10}+10\,\mathrm{Sin}[5]$ 4) $-\frac{277}{10}+10\,\mathrm{Sin}[5]$

Exercise 2

Compute the area of the domain whose boundary is the curve

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

$$r(t)=\left\{\frac{\left(-\frac{1}{2}\sqrt{3}\,\sin(t)-\frac{1}{2}\right)\cos(t)\,(7\cos(t)+10)}{\sin^2(t)+1},\ \frac{\left(\frac{\sqrt{3}}{2}-\frac{\sin(t)}{2}\right)\cos(t)\,(7\cos(t)+10)}{\sin^2(t)+1}\right\}$$

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

1) 213.062 2) 142.062 3) 42.662 4) 85.262

Exercise 3

Consider the vectorial field F(x,y,z) = $\{8y-4yz-\mathrm{Sin}[z^2],\ -5+\mathrm{Sin}[x^2+z^2],\ e^{x^2+2y^2}-4y-6yz\}$ and the surface

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

Compute $\int_S F.$

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

1) −1766.09 2) −452.389 3) 363.011 4) −1313.09

Further Mathematics - Grado en Ingeniería - 2019/2020
04-Line-surface integral-Test 1 for serial number: 13

Exercise 1

Consider the vectorial field $F(x,y,z) = (3x^2 y^3 z^3 (2z - 3yz),$
$-3x^3 y^3 z^4 + 3x^3 y^2 z^3 (2z - 3yz) + 3, x^3 (2 - 3y) y^3 z^3 + 3x^3 y^3 z^2 (2z - 3yz)$
). 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) -9.105 2) 5.295 3) -1.505 4) -8.505

Exercise 2

Compute the area of the domain whose boundary is the curve

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

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

1) 5090.09 2) 19086.5 3) 16541.7 4) 12724.5

Exercise 3

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

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

Compute $\int_S F$.

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

1) -2.11858×10^6 2) 882742. 3) 4.23716×10^6 4) 3.97234×10^6

Further Mathematics - Grado en Ingeniería - 2019/2020
04-Line-surface integral-Test 1 for serial number: 14

Exercise 1

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

. Calculate the value of the potential at the point $p=(-6,-5,2)$.

1) $\frac{25678}{5}+87\,\text{Cos}[60]$ 2) $-2724+87\,\text{Cos}[60]$ 3) $-\frac{131099}{10}+87\,\text{Cos}[60]$ 4) $\frac{14201}{2}+87\,\text{Cos}[60]$

Exercise 2

Compute the area of the domain whose boundary is the curve

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

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

1) 1.1781 2) 1.4781 3) 0.878097 4) 1.7781

Exercise 3

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

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

Compute $\int_S F$.

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

1) -3.5 2) -2.8 3) 0. 4) 3.7

Further Mathematics - Grado en Ingeniería - 2019/2020
04-Line-surface integral-Test 1 for serial number: 15

Exercise 1

Consider the vectorial field $F(x,y,z) = \left(-6xy^2 + \frac{y(-3yz-y)}{xy+1} - 2xy,\ -6x^2y - x^2 + \frac{x(-3yz-y)}{xy+1} + (-3z-1)\log(xy+1),\ -3y\log(xy+1)\right)$. 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) −0.240734 2) 4.15927 3) 2.15927 4) −0.640734

Exercise 2

Compute the area of the domain whose boundary is the curve

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

$r(t) = \{(2t+6)\sin(2t)(8\cos(19t)+8),\ (5t+7)\sin(t)(8\cos(19t)+8)\}$

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

1) 30078.5 2) 15924.1 3) 17693.4 4) 26539.9

Exercise 3

Consider the vectorial field $F(x,y,z) = \{5xyz - 8x^2y^2z,\ 9xy - 6x^2y^2z,\ -8xy\}$ and the surface

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

Compute $\int_S F.$

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

1) 2.40502×10^6 2) −481004. 3) −962008. 4) 4.81004×10^6

Further Mathematics - Grado en Ingeniería - 2019/2020
04-Line-surface integral-Test 1 for serial number: 16

Exercise 1

Consider the vectorial field $F(x,y,z) = (-2 x y^2 + z \sin(x y z) + y z (x z + y z) \cos(x y z),$
$-2 x^2 y + z \sin(x y z) + x z (x z + y z) \cos(x y z), (x + y) \sin(x y z) + x y (x z + y z) \cos(x y z)$
). Compute the potential function for this field whose potential at the origin is 8.

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

1) 10.0967   2) 17.7967   3) 7.99672   4) −17.2033

Exercise 2

Compute the area of the domain whose boundary is the curve

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

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

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

1) 18.3257   2) 11.9257   3) 16.7257   4) 23.1257

Exercise 3

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

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

Compute $\int_S F.$

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

1) −7838.07   2) 7236.93   3) 3920.43   4) 3015.93

Further Mathematics - Grado en Ingeniería - 2019/2020
04-Line-surface integral-Test 1 for serial number: 17

Exercise 1

Consider the vectorial field $F(x,y,z)=(-2y,-2x-2z\cos(yz),-2y\cos(yz))$. 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) -22.4796 2) -0.979624 3) -4.97962 4) 14.5204

Exercise 2

Compute the area of the domain whose boundary is the curve

$r:[0,\pi]---\!\!\to R^2$
$r(t)=\{(7t+4)\sin(2t)(3\cos(14t)+7),\ (3t+8)\sin(t)\}$

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

1) 3441.85 2) 1811.95 3) 182.053 4) 2355.25

Exercise 3

Consider the vectorial field $F(x,y,z)=\{6xy^2+4x^2z,\ 8xz^2+2x^2z^2,\ 5xy^2z\}$ and the surface

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

Compute $\int_S F$.

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

1) $-102\,919.$ 2) -4573.99 3) $66\,326.1$ 4) $-22\,870.8$

Further Mathematics - Grado en Ingeniería - 2019/2020
04-Line-surface integral-Test 1 for serial number: 18

Exercise 1

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

. Calculate the value of the potential at the point $p = (7,0,0)$.

1) $\frac{2}{5}$ 2) 1 3) 2 4) $-\frac{11}{5}$

Exercise 2

Compute the area of the domain whose boundary is the curve

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

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

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

1) 69.6998 2) 96.1998 3) 90.8998 4) 53.7998

Exercise 3

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

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

Compute $\int_S F$.

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

1) −21 815.6 2) −10 907.6 3) 23 998. 4) −4362.81

Further Mathematics - Grado en Ingeniería - 2019/2020
04-Line-surface integral-Test 1 for serial number: 19

Exercise 1

Consider the vectorial field $F(x,y,z) = (-x^2 y^2 z^3 + 2 x y^2 z^2 (-x z - 2 y z) + 2 x y^2$ $, -2 x^2 y^2 z^3 + 2 x^2 y z^2 (-x z - 2 y z) + 2 x^2 y, x^2 y^2 z^2 (-x - 2 y) + 2 x^2 y^2 z (-x z - 2 y z)$). 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) -2.95139   2) -2.05139   3) 8.14861   4) 4.54861

Exercise 2

Compute the area of the domain whose boundary is the curve

$r: [0,\pi] \dashrightarrow R^2$
$r(t) = \{(3 t + 8) \sin(2 t) (8 \cos(19 t) + 9), (2 t + 8) \sin(t) (8 \cos(19 t) + 9)\}$

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

1) 17 248.3   2) 19 404.3   3) 15 092.3   4) 21 560.3

Exercise 3

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

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

Compute $\int_S F.$

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

1) -68 521.9   2) 185 009.   3) 102 783.   4) -47 965.3

Further Mathematics - Grado en Ingeniería - 2019/2020
04-Line-surface integral-Test 1 for serial number: 20

Exercise 1

Consider the vectorial field $F(x,y,z) = (-4xy^2 + 2y^2 z - 1, 4xyz - 4x^2 y, 2xy^2)$. 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) -1.55556 2) -19.1556 3) -7.15556 4) -3.55556

Exercise 2

Compute the area of the domain whose boundary is the curve

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

$r(t) = \left\{\sin(2t)\,(7\cos(t) + 10)\left(\frac{1}{2}\sqrt{3}\cos(t) - \frac{\sin(t)}{2}\right), \sin(2t)\,(7\cos(t) + 10)\left(\frac{1}{2}\sqrt{3}\sin(t) + \frac{\cos(t)}{2}\right)\right\}$

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

1) 58.9821 2) 39.5821 3) 97.7821 4) 126.882

Exercise 3

Consider the vectorial field $F(x,y,z) =$
$\{-8 + 9z + \mathrm{Cos}[2y^2 + z^2], -3xz - \mathrm{Sin}[x^2 + 2z^2], 5y - xyz - \mathrm{Sin}[2x^2 + y^2]\}$ and the surface

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

Compute $\int_S F$.

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

1) -4825.49 2) -9168.89 3) -2412.49 4) -23 646.9