Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 1

Exercise 1

Consider the vector field $F(x,y,z)=(x,y,0)$ and the parameterized surface

$X:[-1,1]\times[-1,1]\longrightarrow\mathbb{R}^3$

$X(u,v)=(1+2v,2u+2uv,2v+2v^2)$

Compute $\int_X F.$

1) -68.9333 2) 284.867 3) -144.333 4) 58.6667

Exercise 2

Consider the vector field $F(x,y,z)=(0,0,z)$ and the parameterized curve

$\sigma:[-1,1]\longrightarrow\mathbb{R}^3$

$\sigma(t)=(t,t^2,2t^2)$

Compute $\int_\sigma F.$

1) 3.9 2) -3.5 3) -2.2 4) $0.$

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 2

Exercise 1

Consider the vector field $F(x,y,z) = (-z, 0, 0)$ and the parameterized surface

$X: [-1, 1] \times [-1, 0] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2v, u, 2u^2 + uv)$

Compute $\int_X F.$

1) 0.333333 2) −0.666667 3) −2.06667 4) −0.166667

Exercise 2

Consider the vector field $F(x,y,z) = (0, 0, x)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t^2, t^2, 2)$

Compute $\int_\sigma F.$

1) −1. 2) 0. 3) −0.5 4) −2.4

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 3

Exercise 1

Consider the vector field $F(x,y,z) = (-x, -z, 0)$ and the parameterized surface

$X: [0, 1] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (u\,v, 3\,v, 2\,u)$

Compute $\int_X F.$

1) 0.0333333 2) −7.46667 3) −2.66667 4) −9.86667

Exercise 2

Consider the vector field $F(x,y,z) = (0, x, y)$ and the parameterized curve

$\sigma: [0, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2, 2, 2\,t)$

Compute $\int_\sigma F.$

1) 10.4 2) 4. 3) 0.4 4) 13.6

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 4

Exercise 1

Consider the vector field $F(x,y,z) = (-x, -z, 0)$ and the parameterized surface

$X: [-1, 0] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (4v, uv + 2v^2, 2 + v^2)$

Compute $\int_X F.$

1) -0.4 2) $0.$ 3) -2.6 4) $1.$

Exercise 2

Consider the vector field $F(x,y,z) = (0, x, y)$ and the parameterized curve

$\sigma: [-1, 0] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t, t^2, 1 + t)$

Compute $\int_\sigma F.$

1) -1.6 2) $1.$ 3) $2.$ 4) 0.6

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 5

Exercise 1

Consider the vector field $F(x,y,z) = (-y, -z, 0)$ and the parameterized surface

$X: [0,1] \times [0,1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (u^2, u + 2v^2, u + 2u^2)$

Compute $\int_X F.$

1) 9.66667 2) −12.8333 3) −17.3333 4) −16.4333

Exercise 2

Consider the vector field $F(x,y,z) = (-z, 0, y)$ and the parameterized curve

$\sigma: [0,1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2 + t^2, 2 + 2t, 4t)$

Compute $\int_\sigma F.$

1) −13.1667 2) −17.6667 3) 9.33333 4) −16.7667

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 6

Exercise 1

Consider the vector field $F(x,y,z)=(0,0,y)$ and the parameterized surface

$X:[-1,0]\times[0,1]\longrightarrow\mathbb{R}^3$

$X(u,v)=(u,3u^2,v^2)$

Compute $\int_X F.$

1) 0. 2) 0.1 3) −3.7 4) −1.2

Exercise 2

Consider the vector field $F(x,y,z)=(z,0,-x)$ and the parameterized curve

$\sigma:[-1,0]\longrightarrow\mathbb{R}^3$

$\sigma(t)=(2+t,t+2t^2,t)$

Compute $\int_\sigma F.$

1) 0.4 2) −2.2 3) −2. 4) 5.4

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 7

Exercise 1

Consider the vector field $F(x,y,z) = (-z, 0, -x)$ and the parameterized surface

$X: [0, 1] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2, v^2, 2uv + 2v^2)$

Compute $\int_X F.$

1) -0.7 2) 10.7 3) -4.9 4) 3.2

Exercise 2

Consider the vector field $F(x,y,z) = (z, -y, 0)$ and the parameterized curve

$\sigma: [0, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (1, t, t^2)$

Compute $\int_\sigma F.$

1) -0.5 2) 2.2 3) $-3.$ 4) 0.8

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 8

Exercise 1

Consider the vector field $F(x,y,z) = (x, 0, z)$ and the parameterized surface

$X: [-1, 0] \times [-1, 0] \longrightarrow \mathbb{R}^3$

$X(u,v) = (u^2, v, 2u + 2uv)$

Compute $\int_X F.$

1) -0.266667 2) 0.333333 3) 1.43333 4) -2.56667

Exercise 2

Consider the vector field $F(x,y,z) = (0, x, y)$ and the parameterized curve

$\sigma: [-1, 0] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (3t^2, 3, 2 + 2t)$

Compute $\int_\sigma F.$

1) -11.4 2) 12.6 3) $6.$ 4) 2.4

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 9

Exercise 1

Consider the vector field $F(x,y,z) = (0, x, -z)$ and the parameterized surface

$X: [-1, 1] \times [-1, 0] \longrightarrow \mathbb{R}^3$

$X(u,v) = (u\,v, 2\,v + 2\,u\,v, 2 + v^2)$

Compute $\int_X F.$

1) -9.5 2) $5.$ 3) $-10.$ 4) -14.5

Exercise 2

Consider the vector field $F(x,y,z) = (0, -x, -y)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2\,t^2, 2, 2\,t)$

Compute $\int_\sigma F.$

1) 15.2 2) $-8.$ 3) $16.$ 4) 23.2

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 10

Exercise 1

Consider the vector field $F(x,y,z)=(0,-y,-z)$ and the parameterized surface

$X:[0,1]\times[0,1]\longrightarrow\mathbb{R}^3$

$X(u,v)=(u,1+2u,u+2v^2)$

Compute $\int_X F.$

1) -10.8 2) $4.$ 3) 8.8 4) 18.4

Exercise 2

Consider the vector field $F(x,y,z)=(z,-y,x)$ and the parameterized curve

$\sigma:[0,1]\longrightarrow\mathbb{R}^3$

$\sigma(t)=(2+t,2t+2t^2,1)$

Compute $\int_\sigma F.$

1) $-7.$ 2) -15.4 3) 18.9 4) -32.2

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 11

Exercise 1

Consider the vector field $F(x,y,z)=(-z,-x,0)$ and the parameterized surface

$X:[0,1]\times[-1,0]\longrightarrow\mathbb{R}^3$

$X(u,v)=(uv,3,2u+uv)$

Compute $\int_X F.$

1) 4.13333 2) -3.46667 3) 0.333333 4) -1.96667

Exercise 2

Consider the vector field $F(x,y,z)=(0,0,z)$ and the parameterized curve

$\sigma:[0,1]\longrightarrow\mathbb{R}^3$

$\sigma(t)=(2t^2,2+t,2)$

Compute $\int_\sigma F.$

1) 3.8 2) -2.3 3) 0. 4) -3.8

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 12

Exercise 1

Consider the vector field $F(x,y,z) = (0, -x, 0)$ and the parameterized surface

$X: [-1, 1] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (1 + 2u^2, u^2 + 2v^2, 2v)$

Compute $\int_X F.$

1) 0. 2) 1.6 3) 3.5 4) 2.2

Exercise 2

Consider the vector field $F(x,y,z) = (z, -y, 0)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t, 2t, 4t^2)$

Compute $\int_\sigma F.$

1) 5.86667 2) 2.66667 3) 7.06667 4) 9.66667

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 13

Exercise 1

Consider the vector field $F(x,y,z) = (0, x, 0)$ and the parameterized surface

$X: [-1, 1] \times [0, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (u^2 + 2v, u^2 + 2uv, 2 + 2v)$

Compute $\int_X F.$

1) -0.9 2) $0.$ 3) 0.6 4) 1.6

Exercise 2

Consider the vector field $F(x,y,z) = (-y, x, 0)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2t + t^2, 2t^2, 2t + t^2)$

Compute $\int_\sigma F.$

1) 0.866667 2) 3.86667 3) 5.86667 4) 2.66667

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 14

Exercise 1

Consider the vector field $F(x,y,z) = (-z, 0, -y)$ and the parameterized surface

$X: [-1, 0] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (u + u^2, u^2 + 2v, 2)$

Compute $\int_X F.$

1) 0.666667 2) 4.16667 3) 3.86667 4) 0.0666667

Exercise 2

Consider the vector field $F(x,y,z) = (0, -x, 0)$ and the parameterized curve

$\sigma: [-1, 0] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2t, 2 + 2t, t)$

Compute $\int_\sigma F.$

1) 0.8 2) 9. 3) 2. 4) 8.4

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 15

Exercise 1

Consider the vector field $F(x,y,z) = (-z, -y, -x)$ and the parameterized surface

$X: [0, 1] \times [-1, 0] \longrightarrow \mathbb{R}^3$

$X(u,v) = (u^2, u + 2v^2, v)$

Compute $\int_X F.$

1) -0.766667 2) 1.23333 3) -4.56667 4) 2.83333

Exercise 2

Consider the vector field $F(x,y,z) = (0, 0, x)$ and the parameterized curve

$\sigma: [0, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t + t^2, t, t + t^2)$

Compute $\int_\sigma F.$

1) -1.6 2) 0.4 3) -5.4 4) $2.$

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 16

Exercise 1

Consider the vector field $F(x,y,z) = (0, -z, -y)$ and the parameterized surface

$X: [-1, 0] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2u + 2v^2, 1, 2uv)$

Compute $\int_X F.$

1) 0. 2) 2.7 3) 2.4 4) 3.2

Exercise 2

Consider the vector field $F(x,y,z) = (0, 0, x)$ and the parameterized curve

$\sigma: [-1, 0] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2t, 1 + 2t^2, 2)$

Compute $\int_\sigma F.$

1) 2.7 2) 0. 3) 3.2 4) 2.4

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 17

Exercise 1

Consider the vector field $F(x,y,z)=(-y,x,z)$ and the parameterized surface

$X:[0,1]\times[-1,0]\longrightarrow\mathbb{R}^3$

$X(u,v)=(2,2v,2u+v^2)$

Compute $\int_X F.$

1) $-4.$ 2) -1.2 3) -6.4 4) $8.$

Exercise 2

Consider the vector field $F(x,y,z)=(y,z,0)$ and the parameterized curve

$\sigma:[0,1]\longrightarrow\mathbb{R}^3$

$\sigma(t)=(t^2,t,2t)$

Compute $\int_\sigma F.$

1) -1.33333 2) 0.966667 3) 2.26667 4) 1.66667

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 18

Exercise 1

Consider the vector field $F(x,y,z) = (-z, 0, -y)$ and the parameterized surface

$X: [-1, 0] \times [0, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (u^2, v + v^2, v)$

Compute $\int_X F.$

1) 5.8 2) 2. 3) 4.6 4) -1.6

Exercise 2

Consider the vector field $F(x,y,z) = (-x, -z, 0)$ and the parameterized curve

$\sigma: [-1, 0] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (1 + 2t, t, 4)$

Compute $\int_\sigma F.$

1) -9.2 2) -4. 3) -11.6 4) 3.2

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 19

Exercise 1

Consider the vector field $F(x,y,z) = (0, x, 0)$ and the parameterized surface

$X: [-1, 1] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2v + 2uv, uv, u^2 + 2uv)$

Compute $\int_X F.$

1) -1.33333 2) 48.6667 3) 32.6667 4) 10.6667

Exercise 2

Consider the vector field $F(x,y,z) = (y, -z, 0)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t, 2t^2, 2t)$

Compute $\int_\sigma F.$

1) -19.2 2) -12.8 3) 0.8 4) $-4.$

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 20

Exercise 1

Consider the vector field $F(x,y,z) = (-y, 0, x)$ and the parameterized surface

$X: [-1, 0] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (u + 2u^2, u, u^2 + 2v^2)$

Compute $\int_X F.$

1) -1.3 2) -0.9 3) 3.6 4) $0.$

Exercise 2

Consider the vector field $F(x,y,z) = (0, z, 0)$ and the parameterized curve

$\sigma: [-1, 0] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2t, t + 2t^2, 3t^2)$

Compute $\int_\sigma F.$

1) 0.6 2) -9.2 3) -0.2 4) $-2.$

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 21

Exercise 1

Consider the vector field $F(x,y,z) = (z, x, 0)$ and the parameterized surface

$X: [-1, 0] \times [-1, 0] \longrightarrow \mathbb{R}^3$

$X(u,v) = (v^2, 1 + 2u^2, 2 + 2u^2)$

Compute $\int_X F.$

1) -0.6 2) $1.$ 3) 4.9 4) -0.1

Exercise 2

Consider the vector field $F(x,y,z) = (0, -x, 0)$ and the parameterized curve

$\sigma: [-1, 0] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t^2, 1 + t, 2t^2)$

Compute $\int_\sigma F.$

1) -4.23333 2) -0.333333 3) 1.26667 4) 0.766667

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 22

Exercise 1

Consider the vector field $F(x,y,z)=(0,0,z)$ and the parameterized surface

$X:[0,1]\times[-1,1]\longrightarrow\mathbb{R}^3$

$X(u,v)=(2,2u+uv,v)$

Compute $\int_X F.$

1) 0. 2) −2.1 3) −1.4 4) 0.4

Exercise 2

Consider the vector field $F(x,y,z)=(0,z,0)$ and the parameterized curve

$\sigma:[0,1]\longrightarrow\mathbb{R}^3$

$\sigma(t)=(2t,2t^2,1+t)$

Compute $\int_\sigma F.$

1) −0.866667 2) 3.33333 3) −2.96667 4) 4.53333

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 23

Exercise 1

Consider the vector field $F(x,y,z) = (x, 0, 0)$ and the parameterized surface

$X: [-1, 1] \times [-1, 0] \longrightarrow \mathbb{R}^3$

$X(u,v) = (v, u^2, u\,v + 2\,v^2)$

Compute $\int_X F.$

1) -0.666667 2) -0.566667 3) -4.46667 4) -0.0666667

Exercise 2

Consider the vector field $F(x,y,z) = (-z, 0, 0)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t^2, t^2, 3\,t)$

Compute $\int_\sigma F.$

1) $-4.$ 2) -1.6 3) -19.2 4) -3.6

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 24

Exercise 1

Consider the vector field $F(x,y,z) = (x, z, 0)$ and the parameterized surface

$X: [0, 1] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2u^2, 2u^2 + uv, 2u)$

Compute $\int_X F$.

1) 4.8 2) 4. 3) -2. 4) 1.

Exercise 2

Consider the vector field $F(x,y,z) = (-y, 0, 0)$ and the parameterized curve

$\sigma: [0, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2t, t, 3)$

Compute $\int_\sigma F$.

1) 0.5 2) 2.4 3) -1. 4) 2.

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 25

Exercise 1

Consider the vector field $F(x,y,z) = (-x, z, 0)$ and the parameterized surface

$X: [0, 1] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2v, u^2, 2u^2)$

Compute $\int_X F.$

1) 4.8 2) 9.6 3) 8. 4) -1.6

Exercise 2

Consider the vector field $F(x,y,z) = (-x, z, 0)$ and the parameterized curve

$\sigma: [0, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (1, t, 2 + 2t^2)$

Compute $\int_\sigma F.$

1) 1.86667 2) 3.06667 3) 2.66667 4) 0.266667

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 26

Exercise 1

Consider the vector field $F(x,y,z)=(y,0,z)$ and the parameterized surface

$X:[-1,0]\times[-1,1]\longrightarrow\mathbb{R}^3$

$X(u,v)=(u^2,4v^2,v)$

Compute $\int_X F.$

1) -18.5333 2) -5.33333 3) -14.3333 4) 16.2667

Exercise 2

Consider the vector field $F(x,y,z)=(0,-z,-x)$ and the parameterized curve

$\sigma:[-1,0]\longrightarrow\mathbb{R}^3$

$\sigma(t)=(1,t,2t^2)$

Compute $\int_\sigma F.$

1) 2.83333 2) -2.26667 3) 3.53333 4) 1.33333

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 27

Exercise 1

Consider the vector field $F(x,y,z)=(0,0,z)$ and the parameterized surface

$X:[-1,1]\times[0,1]\longrightarrow\mathbb{R}^3$

$X(u,v)=(uv,2v,2+v)$

Compute $\int_X F.$

1) -9.66667 2) 3.33333 3) 5.33333 4) 22.3333

Exercise 2

Consider the vector field $F(x,y,z)=(0,0,-z)$ and the parameterized curve

$\sigma:[-1,1]\longrightarrow\mathbb{R}^3$

$\sigma(t)=(1+t^2,2,2+2t^2)$

Compute $\int_\sigma F.$

1) $-3.$ 2) -0.4 3) $0.$ 4) 3.4

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 28

Exercise 1

Consider the vector field $F(x,y,z) = (z, -x, 0)$ and the parameterized surface

$X: [0,1] \times [0,1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (u v + v^2, u, u^2 + v)$

Compute $\int_X F.$

1) 2.43333 2) -1.46667 3) -0.166667 4) 0.333333

Exercise 2

Consider the vector field $F(x,y,z) = (z, y, x)$ and the parameterized curve

$\sigma: [0,1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t + t^2, 4, 2t + 2t^2)$

Compute $\int_\sigma F.$

1) 8. 2) 18.4 3) -12.8 4) 4.

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 29

Exercise 1

Consider the vector field $F(x,y,z) = (0, 0, x)$ and the parameterized surface

$X: [0, 1] \times [0, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (u + u^2, u^2, 2v)$

Compute $\int_X F.$

1) -2.8 2) $0.$ 3) -1.8 4) 1.6

Exercise 2

Consider the vector field $F(x,y,z) = (0, z, 0)$ and the parameterized curve

$\sigma: [0, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (4t, t^2, 2t^2)$

Compute $\int_\sigma F.$

1) -1.8 2) $1.$ 3) -0.8 4) 2.6

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 30

Exercise 1

Consider the vector field $F(x,y,z)=(y,z,0)$ and the parameterized surface

$X:[-1,0]\times[-1,1]\longrightarrow\mathbb{R}^3$

$X(u,v)=(2v,2,2+2u)$

Compute $\int_X F.$

1) 8. 2) 8.8 3) −15.2 4) 34.4

Exercise 2

Consider the vector field $F(x,y,z)=(-x,0,-z)$ and the parameterized curve

$\sigma:[-1,0]\longrightarrow\mathbb{R}^3$

$\sigma(t)=(1,t^2,1)$

Compute $\int_\sigma F.$

1) 0. 2) −2.9 3) 0.1 4) 3.3

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 31

Exercise 1

Consider the vector field $F(x,y,z) = (0, z, x)$ and the parameterized surface

$X: [0,1] \times [0,1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2u^2, u^2 + v^2, u + v)$

Compute $\int_X F.$

1) -0.333333 2) 2.86667 3) -0.533333 4) -4.23333

Exercise 2

Consider the vector field $F(x,y,z) = (0, 0, -x)$ and the parameterized curve

$\sigma: [0,1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2t + 2t^2, t^2, 3t)$

Compute $\int_\sigma F.$

1) -24.5 2) $-5.$ 3) $-6.$ 4) $11.$

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 32

Exercise 1

Consider the vector field $F(x,y,z) = (-x, -z, 0)$ and the parameterized surface

$X: [-1, 0] \times [0, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (u + u\,v, 2\,u^2 + v, 2\,v^2)$

Compute $\int_X F.$

1) 0.955556 2) −2.54444 3) −0.844444 4) −4.84444

Exercise 2

Consider the vector field $F(x,y,z) = (z, 0, x)$ and the parameterized curve

$\sigma: [-1, 0] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t + t^2, t + t^2, 3\,t^2)$

Compute $\int_\sigma F.$

1) 0. 2) 4. 3) −1.8 4) 1.7

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 33

Exercise 1

Consider the vector field $F(x,y,z)=(y,0,z)$ and the parameterized surface

$X:[-1,1]\times[-1,0]\longrightarrow\mathbb{R}^3$

$X(u,v)=(2u,2u,v^2)$

Compute $\int_X F.$

1) 0. 2) -1.8 3) -3.4 4) 0.2

Exercise 2

Consider the vector field $F(x,y,z)=(0,x,-y)$ and the parameterized curve

$\sigma:[-1,1]\longrightarrow\mathbb{R}^3$

$\sigma(t)=(t^2,1+2t^2,2t)$

Compute $\int_\sigma F.$

1) 5.93333 2) -6.66667 3) 17.1333 4) -8.06667

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 34

Exercise 1

Consider the vector field $F(x,y,z) = (-y, 0, -z)$ and the parameterized surface

$X: [-1, 1] \times [-1, 0] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2u, 2u, v)$

Compute $\int_X F.$

1) 0. 2) 0.3 3) −0.1 4) 1.9

Exercise 2

Consider the vector field $F(x,y,z) = (x, -y, z)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t^2, t + 2t^2, 1)$

Compute $\int_\sigma F.$

1) −4. 2) −5.2 3) −3.6 4) −11.6

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 35

Exercise 1

Consider the vector field $F(x,y,z) = (-z, 0, -y)$ and the parameterized surface

$X: [0,1] \times [0,1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2uv, u^2 + 2uv, u^2)$

Compute $\int_X F.$

1) -5.2 2) 9.8 3) 2.6 4) $7.$

Exercise 2

Consider the vector field $F(x,y,z) = (0, 0, -y)$ and the parameterized curve

$\sigma: [0,1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2 + t, t + t^2, 2t^2)$

Compute $\int_\sigma F.$

1) -2.33333 2) -8.93333 3) 9.36667 4) -13.1333

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 36

Exercise 1

Consider the vector field $F(x,y,z)=(z,0,-y)$ and the parameterized surface

$X:[0,1]\times[-1,1]\longrightarrow\mathbb{R}^3$

$X(u,v)=(u+2uv,u,2u^2+2uv)$

Compute $\int_X F.$

1) -8.06667 2) 14.1333 3) 3.33333 4) 6.63333

Exercise 2

Consider the vector field $F(x,y,z)=(-z,0,0)$ and the parameterized curve

$\sigma:[0,1]\longrightarrow\mathbb{R}^3$

$\sigma(t)=(2t+2t^2,2t,1+t)$

Compute $\int_\sigma F.$

1) -31.5333 2) -14.0333 3) 20.2667 4) -6.33333

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 37

Exercise 1

Consider the vector field $F(x,y,z) = (y, -z, -x)$ and the parameterized surface

$X: [-1, 1] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (1 + v, 2v, u^2)$

Compute $\int_X F.$

1) -0.9 2) $0.$ 3) 0.1 4) -0.7

Exercise 2

Consider the vector field $F(x,y,z) = (z, -y, 0)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t, 1, 3)$

Compute $\int_\sigma F.$

1) 6.6 2) $6.$ 3) 1.8 4) 0.6

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 38

Exercise 1

Consider the vector field $F(x,y,z) = (-z, y, -x)$ and the parameterized surface

$X: [0,1] \times [0,1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (4v^2, 2u + 2v^2, u + uv)$

Compute $\int_X F.$

1) 106.1 2) −86.1 3) 50.3 4) 31.7

Exercise 2

Consider the vector field $F(x,y,z) = (-y, 0, 0)$ and the parameterized curve

$\sigma: [0,1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2 + 2t^2, 3t^2, 2)$

Compute $\int_\sigma F.$

1) −10.2 2) 8.4 3) −4.8 4) −3.

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 39

Exercise 1

Consider the vector field $F(x,y,z) = (0, -z, x)$ and the parameterized surface

$X: [-1, 0] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (v, 2u, 2v + uv)$

Compute $\int_X F.$

1) $-1.$ 2) -1.4 3) 0.4 4) 0.1

Exercise 2

Consider the vector field $F(x,y,z) = (y, -x, 0)$ and the parameterized curve

$\sigma: [-1, 0] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (1 + t^2, 2 + 2t, 2 + t^2)$

Compute $\int_\sigma F.$

1) 1.06667 2) -3.33333 3) 2.26667 4) -4.93333

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 40

Exercise 1

Consider the vector field $F(x,y,z)=(-y,0,-z)$ and the parameterized surface

$X:[-1,0]\times[-1,0]\longrightarrow\mathbb{R}^3$

$X(u,v)=(2uv,2,v)$

Compute $\int_X F.$

1) 2.7 2) −1.5 3) 0. 4) −3.2

Exercise 2

Consider the vector field $F(x,y,z)=(-y,0,-x)$ and the parameterized curve

$\sigma:[-1,0]\longrightarrow\mathbb{R}^3$

$\sigma(t)=(2t^2,t,2)$

Compute $\int_\sigma F.$

1) 1.66667 2) 5.06667 3) −6.73333 4) −1.33333

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 41

Exercise 1

Consider the vector field $F(x,y,z) = (0, -y, z)$ and the parameterized surface

$X: [-1, 0] \times [-1, 0] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2v, 2 + uv, 2v)$

Compute $\int_X F.$

1) -3.73333 2) 1.66667 3) 4.26667 4) -1.33333

Exercise 2

Consider the vector field $F(x,y,z) = (-x, 0, z)$ and the parameterized curve

$\sigma: [-1, 0] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2t^2, t + t^2, 2 + 2t)$

Compute $\int_\sigma F.$

1) $-2.$ 2) $4.$ 3) -7.2 4) 8.8

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 42

Exercise 1

Consider the vector field $F(x,y,z) = (z, 0, y)$ and the parameterized surface

$X: [-1, 0] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (3v^2, u^2 + uv, 1 + 2u)$

Compute $\int_X F.$

1) -6.66667 2) -4.66667 3) -10.6667 4) -12.1667

Exercise 2

Consider the vector field $F(x,y,z) = (-y, 0, -z)$ and the parameterized curve

$\sigma: [-1, 0] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2t, 1 + 2t^2, 2t^2)$

Compute $\int_\sigma F.$

1) -1.33333 2) -2.13333 3) -4.33333 4) -3.73333

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 43

Exercise 1

Consider the vector field $F(x,y,z) = (-x, -y, 0)$ and the parameterized surface

$X: [-1, 1] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2v, u^2, v^2)$

Compute $\int_X F.$

1) -3.8 2) -1.4 3) $0.$ 4) -3.3

Exercise 2

Consider the vector field $F(x,y,z) = (-z, -x, -y)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (1 + t^2, 3t^2, 2t^2)$

Compute $\int_\sigma F.$

1) $0.$ 2) -1.4 3) -3.8 4) -3.3

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 44

Exercise 1

Consider the vector field $F(x,y,z) = (0, z, x)$ and the parameterized surface

$X: [0, 1] \times [-1, 0] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2, 2uv + v^2, 2u)$

Compute $\int_X F$.

1) 2. 2) -3.2 3) 0. 4) -3.3

Exercise 2

Consider the vector field $F(x,y,z) = (-z, -x, -y)$ and the parameterized curve

$\sigma: [0, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t + t^2, 2t, 2t^2)$

Compute $\int_\sigma F$.

1) 13.2 2) -18. 3) 13.8 4) -6.

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 45

Exercise 1

Consider the vector field $F(x,y,z) = (0, y, -z)$ and the parameterized surface

$X: [-1, 1] \times [-1, 0] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2v, u + v^2, u^2 + v)$

Compute $\int_X F.$

1) 4. 2) 0.4 3) 2. 4) -0.8

Exercise 2

Consider the vector field $F(x,y,z) = (-y, -x, 0)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t^2, 2t^2, 2t)$

Compute $\int_\sigma F.$

1) 0. 2) 1. 3) -1.4 4) -0.8

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 46

Exercise 1

Consider the vector field $F(x,y,z) = (y, 0, 0)$ and the parameterized surface

$X: [0, 1] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2 + 2uv, u^2, 2u)$

Compute $\int_X F.$

1) 3.6 2) −0.6 3) 0. 4) 0.5

Exercise 2

Consider the vector field $F(x,y,z) = (x, 0, y)$ and the parameterized curve

$\sigma: [0, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t, 2 + 2t^2, t^2)$

Compute $\int_\sigma F.$

1) 14.3 2) 3.5 3) 1.7 4) 5.

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 47

Exercise 1

Consider the vector field $F(x,y,z) = (x, 0, z)$ and the parameterized surface

$X: [0, 1] \times [-1, 0] \longrightarrow \mathbb{R}^3$

$X(u,v) = (3u, v, 2)$

Compute $\int_X F.$

1) $-12.$ 2) $6.$ 3) 21.6 4) -7.2

Exercise 2

Consider the vector field $F(x,y,z) = (0, y, 0)$ and the parameterized curve

$\sigma: [0, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t + 2t^2, 3, 1)$

Compute $\int_\sigma F.$

1) $0.$ 2) 2.6 3) $-3.$ 4) -2.2

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 48

Exercise 1

Consider the vector field $F(x,y,z) = (0, z, 0)$ and the parameterized surface

$X: [-1, 0] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2 + u\,v, 2\,v^2, v^2)$

Compute $\int_X F.$

1) -0.8 2) -2.6 3) 0.9 4) -0.2

Exercise 2

Consider the vector field $F(x,y,z) = (-z, 0, y)$ and the parameterized curve

$\sigma: [-1, 0] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2\,t, 2\,t, 1)$

Compute $\int_\sigma F.$

1) $-2.$ 2) 1.4 3) -0.8 4) -5.6

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 49

Exercise 1

Consider the vector field $F(x,y,z) = (0, 0, -z)$ and the parameterized surface

$X: [0, 1] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2u + 2v^2, 2, 1 + 2u)$

Compute $\int_X F.$

1) -0.5 2) 3.1 3) $0.$ 4) -3.1

Exercise 2

Consider the vector field $F(x,y,z) = (-y, -z, 0)$ and the parameterized curve

$\sigma: [0, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2t, 2 + 2t, 2 + t^2)$

Compute $\int_\sigma F.$

1) -10.6667 2) -5.16667 3) -44.7667 4) 23.4333

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 50

Exercise 1

Consider the vector field $F(x,y,z) = (0, -y, 0)$ and the parameterized surface

$X: [0,1] \times [-1,1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2v^2, 2v + v^2, uv + 2v^2)$

Compute $\int_X F.$

1) $-9.$ 2) -3.2 3) 4.2 4) -1.6

Exercise 2

Consider the vector field $F(x,y,z) = (0, x, 0)$ and the parameterized curve

$\sigma: [0,1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t, 2t, 2)$

Compute $\int_\sigma F.$

1) 1.8 2) -1.9 3) 4.7 4) $1.$

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 51

Exercise 1

Consider the vector field $F(x,y,z) = (-y, 0, 0)$ and the parameterized surface

$X: [-1, 1] \times [0, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (v^2, u^2 + 2v^2, 2uv)$

Compute $\int_X F.$

1) $-6.$ 2) $-4.$ 3) -0.8 4) 4.8

Exercise 2

Consider the vector field $F(x,y,z) = (0, -z, 0)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (1 + t, 3t, 4)$

Compute $\int_\sigma F.$

1) 40.8 2) $-24.$ 3) 28.8 4) 9.6

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 52

Exercise 1

Consider the vector field $F(x,y,z) = (-x, y, 0)$ and the parameterized surface

$X: [-1, 0] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (u^2 + v^2, v, 2u + 2v)$

Compute $\int_X F.$

1) -5.16667 2) 5.33333 3) -9.16667 4) -11.6667

Exercise 2

Consider the vector field $F(x,y,z) = (0, -z, 0)$ and the parameterized curve

$\sigma: [-1, 0] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t, 2t, 2)$

Compute $\int_\sigma F.$

1) 4.4 2) 9.6 3) $-4.$ 4) 7.6

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 53

Exercise 1

Consider the vector field $F(x,y,z) = (x, z, 0)$ and the parameterized surface

$X: [-1, 0] \times [-1, 0] \longrightarrow \mathbb{R}^3$

$X(u,v) = (v, 2v^2, 2u^2)$

Compute $\int_X F.$

1) 3.36667 2) 2.46667 3) 2.36667 4) 0.666667

Exercise 2

Consider the vector field $F(x,y,z) = (-x, z, 0)$ and the parameterized curve

$\sigma: [-1, 0] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t^2, t^2, 3t)$

Compute $\int_\sigma F.$

1) 7.9 2) 6.1 3) 5.9 4) 2.5

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 54

Exercise 1

Consider the vector field $F(x,y,z)=(z,-x,0)$ and the parameterized surface

$X:[0,1]\times[0,1]\longrightarrow\mathbb{R}^3$

$X(u,v)=(2u^2,2+2u,uv)$

Compute $\int_X F.$

1) -1.96667 2) 1.93333 3) -0.866667 4) 4.03333

Exercise 2

Consider the vector field $F(x,y,z)=(z,-x,0)$ and the parameterized curve

$\sigma:[0,1]\longrightarrow\mathbb{R}^3$

$\sigma(t)=(2+2t^2,4,2t^2)$

Compute $\int_\sigma F.$

1) -5.8 2) $2.$ 3) -3.6 4) 6.2

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 55

Exercise 1

Consider the vector field $F(x,y,z)=(x,-z,0)$ and the parameterized surface

$X:[0,1]\times[-1,0]\longrightarrow\mathbb{R}^3$

$X(u,v)=(2uv,3v,u^2)$

Compute $\int_X F.$

1) -1.3 2) 1.8 3) 4.2 4) 1.2

Exercise 2

Consider the vector field $F(x,y,z)=(y,0,0)$ and the parameterized curve

$\sigma:[0,1]\longrightarrow\mathbb{R}^3$

$\sigma(t)=(2t^2,4,2t+t^2)$

Compute $\int_\sigma F.$

1) $32.$ 2) 12.8 3) $-12.$ 4) $8.$

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 56

Exercise 1

Consider the vector field $F(x,y,z) = (-z, 0, -y)$ and the parameterized surface

$X: [-1, 1] \times [0, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2u, 2u^2 + uv, 2v)$

Compute $\int_X F.$

1) 10.2667 2) -13.3333 3) 8.26667 4) -3.33333

Exercise 2

Consider the vector field $F(x,y,z) = (-y, 0, -z)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2 + 2t, 1 + 2t^2, 2)$

Compute $\int_\sigma F.$

1) 17.1333 2) 13.6333 3) -6.66667 4) -24.1667

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 57

Exercise 1

Consider the vector field $F(x,y,z) = (x, 0, 0)$ and the parameterized surface

$X: [0, 1] \times [0, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2u^2, 2v^2, u^2)$

Compute $\int_X F.$

1) 3. 2) 3.8 3) −2. 4) 4.2

Exercise 2

Consider the vector field $F(x,y,z) = (z, x, 0)$ and the parameterized curve

$\sigma: [0, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2 + 2t^2, t, 2t + t^2)$

Compute $\int_\sigma F.$

1) −8.66667 2) −11.0667 3) 6.33333 4) −12.2667

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 58

Exercise 1

Consider the vector field $F(x,y,z) = (-y, -z, 0)$ and the parameterized surface

$X: [-1, 1] \times [-1, 0] \longrightarrow \mathbb{R}^3$

$X(u,v) = (v + v^2, 2 + 2u, 2 + u^2)$

Compute $\int_X F.$

1) -2.3 2) 0.5 3) $-3.$ 4) $0.$

Exercise 2

Consider the vector field $F(x,y,z) = (0, 0, y)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2t^2, 2 + 2t^2, 2t)$

Compute $\int_\sigma F.$

1) 15.6667 2) -12.3333 3) 10.6667 4) -19.3333

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 59

Exercise 1

Consider the vector field $F(x,y,z) = (z, x, 0)$ and the parameterized surface

$X: [-1, 1] \times [-1, 0] \longrightarrow \mathbb{R}^3$

$X(u,v) = (v + 2uv, uv, 2u^2 + 2v)$

Compute $\int_X F.$

1) -7.2 2) -31.2 3) 19.2 4) $16.$

Exercise 2

Consider the vector field $F(x,y,z) = (-y, z, 0)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t^2, 2t, t)$

Compute $\int_\sigma F.$

1) -11.6667 2) 6.03333 3) 7.23333 4) -2.66667

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 60

Exercise 1

Consider the vector field $F(x,y,z) = (0, -y, -x)$ and the parameterized surface

$X: [0,1] \times [-1,0] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2 + 2u^2, 3v, uv)$

Compute $\int_X F.$

1) $-24.$ 2) $-50.$ 3) $-20.$ 4) $-74.$

Exercise 2

Consider the vector field $F(x,y,z) = (x, 0, 0)$ and the parameterized curve

$\sigma: [0,1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (1, t + 2t^2, t)$

Compute $\int_\sigma F.$

1) 0.2 2) $0.$ 3) 1.5 4) 2.7

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 61

Exercise 1

Consider the vector field $F(x,y,z) = (0, z, -y)$ and the parameterized surface

$X: [-1, 1] \times [0, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (v + u\,v, u^2, 1)$

Compute $\int_X F.$

1) 2.2 2) 1.9 3) 0.8 4) 3.2

Exercise 2

Consider the vector field $F(x,y,z) = (0, 0, -z)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (1 + 2\,t, 1 + t^2, 1)$

Compute $\int_\sigma F.$

1) 0. 2) 1.4 3) 1.1 4) 2.4

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 62

Exercise 1

Consider the vector field $F(x,y,z) = (x, 0, 0)$ and the parameterized surface

$X: [-1, 0] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (v^2, 2 + u, 2v + 2v^2)$

Compute $\int_X F.$

1) -0.766667 2) 2.93333 3) 3.13333 4) 1.33333

Exercise 2

Consider the vector field $F(x,y,z) = (0, -z, x)$ and the parameterized curve

$\sigma: [-1, 0] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2t^2, 1 + t^2, 2t + 2t^2)$

Compute $\int_\sigma F.$

1) -2.6 2) $-1.$ 3) 1.1 4) -2.8

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 63

Exercise 1

Consider the vector field $F(x,y,z) = (-x, -z, y)$ and the parameterized surface

$X: [-1, 1] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2uv, 1 + 2uv, 2v)$

Compute $\int_X F.$

1) -9.33333 2) -19.3333 3) -21.3333 4) 10.6667

Exercise 2

Consider the vector field $F(x,y,z) = (y, -z, 0)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2, 2t, 1 + t)$

Compute $\int_\sigma F.$

1) $-4.$ 2) $4.$ 3) 8.8 4) $8.$

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 64

Exercise 1

Consider the vector field $F(x,y,z) = (0, x, z)$ and the parameterized surface

$X: [-1, 1] \times [0, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (u^2 + v, 2u^2 + 2uv, u^2 + 2v)$

Compute $\int_X F.$

1) 3.93333 2) 0.933333 3) 4.03333 4) 0.333333

Exercise 2

Consider the vector field $F(x,y,z) = (y, 0, 0)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2 + 2t, t^2, 2t + t^2)$

Compute $\int_\sigma F.$

1) 0.733333 2) 4.43333 3) 4.33333 4) 1.33333

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 65

Exercise 1

Consider the vector field $F(x,y,z)=(0,x,y)$ and the parameterized surface

$X:[0,1]\times[-1,0]\longrightarrow\mathbb{R}^3$

$X(u,v)=(u,2+2u^2,uv)$

Compute $\int_X F.$

1) -1.13333 2) -2.83333 3) -0.333333 4) 1.86667

Exercise 2

Consider the vector field $F(x,y,z)=(0,-y,-x)$ and the parameterized curve

$\sigma:[0,1]\longrightarrow\mathbb{R}^3$

$\sigma(t)=(t^2,2t^2,2t^2)$

Compute $\int_\sigma F.$

1) 3.6 2) -5.4 3) $-3.$ 4) -10.5

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 66

Exercise 1

Consider the vector field $F(x,y,z) = (-y, x, 0)$ and the parameterized surface

$X: [0, 1] \times [-1, 0] \longrightarrow \mathbb{R}^3$

$X(u,v) = (u + u^2, u^2 + 2uv, uv)$

Compute $\int_X F.$

1) -1.58333 2) -1.38333 3) -8.38333 4) 1.61667

Exercise 2

Consider the vector field $F(x,y,z) = (y, 0, x)$ and the parameterized curve

$\sigma: [0, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2t^2, 2, 2t + t^2)$

Compute $\int_\sigma F.$

1) 27.3333 2) 6.33333 3) 6.93333 4) -2.66667

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 67

Exercise 1

Consider the vector field $F(x,y,z) = (0, -x, -y)$ and the parameterized surface

$X: [-1, 1] \times [0, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2v, 2u^2 + 2uv, 2u)$

Compute $\int_X F.$

1) -0.5 2) $0.$ 3) -1.3 4) $-4.$

Exercise 2

Consider the vector field $F(x,y,z) = (0, -x, -y)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (4, 2t + t^2, 2t + 2t^2)$

Compute $\int_\sigma F.$

1) -11.1667 2) -22.6667 3) 7.23333 4) 69.3333

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 68

Exercise 1

Consider the vector field $F(x,y,z) = (0, -x, -y)$ and the parameterized surface

$X: [-1, 0] \times [0, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2u^2, v, uv)$

Compute $\int_X F.$

1) 2.6 2) −4.4 3) 5.6 4) 7.

Exercise 2

Consider the vector field $F(x,y,z) = (0, -x, -y)$ and the parameterized curve

$\sigma: [-1, 0] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2 + 2t^2, 1, 1 + t^2)$

Compute $\int_\sigma F.$

1) 1. 2) −2.5 3) 2.5 4) 3.2

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 69

Exercise 1

Consider the vector field $F(x,y,z)=(-x, y, -z)$ and the parameterized surface

$X:[0,1]\times[-1,1]\longrightarrow\mathbb{R}^3$

$X(u,v)=(v, u^2, v+2uv)$

Compute $\int_X F.$

1) -0.3 2) $0.$ 3) -0.7 4) $-1.$

Exercise 2

Consider the vector field $F(x,y,z)=(-x, z, 0)$ and the parameterized curve

$\sigma:[0,1]\longrightarrow\mathbb{R}^3$

$\sigma(t)=(1, t^2, 3t^2)$

Compute $\int_\sigma F.$

1) 1.5 2) 0.8 3) 0.5 4) 1.2

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 70

Exercise 1

Consider the vector field $F(x,y,z)=(0,y,x)$ and the parameterized surface

$X:[0,1]\times[0,1]\longrightarrow\mathbb{R}^3$

$X(u,v)=(2,2+2v^2,2+u^2)$

Compute $\int_X F.$

1) 3.1 2) −2.7 3) 1.9 4) 0.

Exercise 2

Consider the vector field $F(x,y,z)=(0,-y,x)$ and the parameterized curve

$\sigma:[0,1]\longrightarrow\mathbb{R}^3$

$\sigma(t)=(3,1+t,1+2t)$

Compute $\int_\sigma F.$

1) 12.1 2) 4.5 3) −6.3 4) 16.9

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 71

Exercise 1

Consider the vector field $F(x,y,z) = (z, x, 0)$ and the parameterized surface

$X: [0,1] \times [0,1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (u^2, 2uv, 2u + 2v)$

Compute $\int_X F.$

1) $-1.$ 2) -3.5 3) 1.2 4) -2.9

Exercise 2

Consider the vector field $F(x,y,z) = (0, -x, 0)$ and the parameterized curve

$\sigma: [0,1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2 + 2t, 1 + 2t, 2)$

Compute $\int_\sigma F.$

1) $-6.$ 2) -17.4 3) $-21.$ 4) 7.2

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 72

Exercise 1

Consider the vector field $F(x,y,z) = (0, x, 0)$ and the parameterized surface

$X: [-1, 0] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (1, 1 + 2u, 2uv)$

Compute $\int_X F.$

1) 0.9 2) 0.7 3) 0. 4) 3.7

Exercise 2

Consider the vector field $F(x,y,z) = (-y, -z, 0)$ and the parameterized curve

$\sigma: [-1, 0] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2 + 2t^2, 4, 2t + 2t^2)$

Compute $\int_\sigma F.$

1) 15.2 2) 37.6 3) 13.6 4) 8.

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 73

Exercise 1

Consider the vector field $F(x,y,z) = (-x, 0, z)$ and the parameterized surface

$X: [-1, 1] \times [0, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (u\,v, 2\,u^2, u)$

Compute $\int_X F.$

1) 0. 2) 3.8 3) 1.4 4) −3.7

Exercise 2

Consider the vector field $F(x,y,z) = (-x, -z, -y)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (1 + t^2, 2\,t^2, 3)$

Compute $\int_\sigma F.$

1) 0. 2) 1.4 3) −3.7 4) 3.8

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 74

Exercise 1

Consider the vector field $F(x,y,z) = (0, 0, z)$ and the parameterized surface

$X: [0, 1] \times [-1, 0] \longrightarrow \mathbb{R}^3$

$X(u,v) = (u, 1, 1 + 2uv)$

Compute $\int_X F.$

1) 0. 2) 3.4 3) -1.1 4) 1.7

Exercise 2

Consider the vector field $F(x,y,z) = (y, x, -z)$ and the parameterized curve

$\sigma: [0, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t^2, 1 + t^2, 2)$

Compute $\int_\sigma F.$

1) 5.4 2) 8.8 3) 2. 4) -0.2

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 75

Exercise 1

Consider the vector field $F(x,y,z) = (0, -y, x)$ and the parameterized surface

$X: [-1, 1] \times [-1, 0] \longrightarrow \mathbb{R}^3$

$X(u,v) = (u\,v + v^2, 3\,v, 2\,v + v^2)$

Compute $\int_X F.$

1) -2.1 2) 0.6 3) -0.5 4) -0.3

Exercise 2

Consider the vector field $F(x,y,z) = (0, z, x)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t^2, t + t^2, t^2)$

Compute $\int_\sigma F.$

1) 2.26667 2) 0.466667 3) -0.433333 4) 0.666667

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 76

Exercise 1

Consider the vector field $F(x,y,z) = (-x, 0, -y)$ and the parameterized surface

$X: [0,1] \times [0,1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2u + 2uv, 2v + 2uv, 2 + v)$

Compute $\int_X F.$

1) $-15.$ 2) -16.5 3) 28.5 4) $-60.$

Exercise 2

Consider the vector field $F(x,y,z) = (0, x, y)$ and the parameterized curve

$\sigma: [0,1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t + 2t^2, 1 + t^2, 2 + t^2)$

Compute $\int_\sigma F.$

1) 3.16667 2) -5.53333 3) 3.46667 4) 12.1667

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 77

Exercise 1

Consider the vector field $F(x,y,z) = (y, z, -x)$ and the parameterized surface

$X: [-1, 1] \times [-1, 0] \longrightarrow \mathbb{R}^3$

$X(u,v) = (u^2, u + v^2, 2u)$

Compute $\int_X F.$

1) 9.4 2) −5.6 3) 2. 4) 6.

Exercise 2

Consider the vector field $F(x,y,z) = (0, -x, z)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (4t^2, 2t^2, 2t^2)$

Compute $\int_\sigma F.$

1) −3.8 2) 0. 3) 3.7 4) 2.

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 78

Exercise 1

Consider the vector field $F(x,y,z) = (-y, z, -x)$ and the parameterized surface

$X: [-1, 0] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (1 + 2u, u + 2v, u + 2v^2)$

Compute $\int_X F.$

1) -7.33333 2) -14.5333 3) -34.5333 4) -37.7333

Exercise 2

Consider the vector field $F(x,y,z) = (z, y, -x)$ and the parameterized curve

$\sigma: [-1, 0] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t, 1 + 2t^2, t + 2t^2)$

Compute $\int_\sigma F.$

1) -9.16667 2) -21.6667 3) -23.6667 4) -4.66667

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 79

Exercise 1

Consider the vector field $F(x,y,z) = (y, 0, z)$ and the parameterized surface

$X: [-1, 0] \times [0, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (v^2, 1 + 2v^2, 2uv)$

Compute $\int_X F.$

1) -21.4667 2) 0.733333 3) -19.0667 4) -5.86667

Exercise 2

Consider the vector field $F(x,y,z) = (0, z, -x)$ and the parameterized curve

$\sigma: [-1, 0] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2 + t, t^2, 3)$

Compute $\int_\sigma F.$

1) $-3.$ 2) -9.6 3) -10.8 4) 0.3

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 80

Exercise 1

Consider the vector field $F(x,y,z) = (-y, z, 0)$ and the parameterized surface

$X: [-1, 0] \times [-1, 0] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2v^2, 2u, v + 2uv)$

Compute $\int_X F.$

1) 2.83333 2) -0.666667 3) 2.33333 4) -1.76667

Exercise 2

Consider the vector field $F(x,y,z) = (0, y, z)$ and the parameterized curve

$\sigma: [-1, 0] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t^2, 3t, 2)$

Compute $\int_\sigma F.$

1) -10. 2) 10.5 3) 13. 4) -4.5

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 81

Exercise 1

Consider the vector field $F(x,y,z) = (-y, 0, -z)$ and the parameterized surface

$X: [-1, 1] \times [0, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (4v, 2u^2 + v, u)$

Compute $\int_X F.$

1) -6.5 2) 54.6 3) 58.5 4) $13.$

Exercise 2

Consider the vector field $F(x,y,z) = (-y, z, x)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t + 2t^2, 2t, t + 2t^2)$

Compute $\int_\sigma F.$

1) 4.53333 2) -0.166667 3) 1.33333 4) 4.83333

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 82

Exercise 1

Consider the vector field $F(x,y,z) = (0, 0, -x)$ and the parameterized surface

$X: [-1, 0] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (u, 2v^2, 1)$

Compute $\int_X F.$

1) 0. 2) -3.8 3) 1.4 4) 1.8

Exercise 2

Consider the vector field $F(x,y,z) = (0, -x, 0)$ and the parameterized curve

$\sigma: [-1, 0] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (1, 2t + 2t^2, 2t^2)$

Compute $\int_\sigma F.$

1) 1.4 2) -3.8 3) 0. 4) 1.8

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 83

Exercise 1

Consider the vector field $F(x,y,z) = (-z, 0, 0)$ and the parameterized surface

$X: [0, 1] \times [-1, 0] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2v^2, 2+u^2, 2u^2)$

Compute $\int_X F.$

1) 3.7 2) −0.9 3) 0. 4) 2.3

Exercise 2

Consider the vector field $F(x,y,z) = (z, 0, -x)$ and the parameterized curve

$\sigma: [0, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t, t^2, t^2)$

Compute $\int_\sigma F.$

1) −4.03333 2) 0.566667 3) −0.333333 4) −2.63333

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 84

Exercise 1

Consider the vector field $F(x,y,z) = (-z, 0, -y)$ and the parameterized surface

$X: [0, 1] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2u^2, 1 + uv, 2u^2)$

Compute $\int_X F.$

1) 4.33333 2) −0.166667 3) −3.16667 4) 0.533333

Exercise 2

Consider the vector field $F(x,y,z) = (0, y, x)$ and the parameterized curve

$\sigma: [0, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (1 + 2t^2, 2 + t, 4)$

Compute $\int_\sigma F.$

1) 2.5 2) 10.1 3) 1.1 4) −4.9

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 85

Exercise 1

Consider the vector field $F(x,y,z) = (0, 0, -z)$ and the parameterized surface

$X: [-1, 1] \times [0, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2u + 2v^2, 1, 2u^2 + 2uv)$

Compute $\int_X F.$

1) -1.2 2) 0.3 3) 0.1 4) $0.$

Exercise 2

Consider the vector field $F(x,y,z) = (y, x, 0)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2, t + 2t^2, 3)$

Compute $\int_\sigma F.$

1) $4.$ 2) 4.4 3) 5.2 4) -0.8

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 86

Exercise 1

Consider the vector field $F(x,y,z) = (0, 0, x)$ and the parameterized surface

$X: [-1, 1] \times [0, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2 + 2v^2, 3, 2 + u^2)$

Compute $\int_X F.$

1) -0.1 2) $0.$ 3) -1.8 4) -1.6

Exercise 2

Consider the vector field $F(x,y,z) = (-x, y, z)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2t, 2t, 2)$

Compute $\int_\sigma F.$

1) -1.6 2) $0.$ 3) -1.8 4) -0.1

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 87

Exercise 1

Consider the vector field $F(x,y,z) = (0, -x, -z)$ and the parameterized surface

$X: [-1, 1] \times [0, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (v, 1, u + v^2)$

Compute $\int_X F.$

1) -0.2 2) $-1.$ 3) 0.9 4) -2.8

Exercise 2

Consider the vector field $F(x,y,z) = (0, 0, x)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (3, 2t, 3)$

Compute $\int_\sigma F.$

1) -0.8 2) 1.8 3) -1.9 4) $0.$

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 88

Exercise 1

Consider the vector field $F(x,y,z) = (-z, -y, 0)$ and the parameterized surface

$X: [0, 1] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (3v, u^2, u + 2v^2)$

Compute $\int_X F.$

1) 3.2 2) 3.8 3) -2. 4) -5.4

Exercise 2

Consider the vector field $F(x,y,z) = (z, 0, -y)$ and the parameterized curve

$\sigma: [0, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t, t^2, 3t)$

Compute $\int_\sigma F.$

1) -2.4 2) 0.5 3) 2.2 4) -2.1

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 89

Exercise 1

Consider the vector field $F(x,y,z) = (x, 0, 0)$ and the parameterized surface

$X: [-1, 0] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2u^2 + 2v^2, 1 + uv, 2 + v)$

Compute $\int_X F.$

1) 2. 2) 3.4 3) 3. 4) 0.

Exercise 2

Consider the vector field $F(x,y,z) = (-x, 0, -y)$ and the parameterized curve

$\sigma: [-1, 0] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2t, 3t^2, 1 + t)$

Compute $\int_\sigma F.$

1) 4. 2) 3. 3) 1. 4) 4.4

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 90

Exercise 1

Consider the vector field $F(x,y,z) = (x, y, -z)$ and the parameterized surface

$X: [-1, 0] \times [0, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (v + u\,v, u, 2 + u)$

Compute $\int_X F.$

1) 0.666667 2) 0.566667 3) 0.866667 4) -1.33333

Exercise 2

Consider the vector field $F(x,y,z) = (-x, 0, -z)$ and the parameterized curve

$\sigma: [-1, 0] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t + t^2, t^2, 2\,t)$

Compute $\int_\sigma F.$

1) 2. 2) 2.4 3) 1.8 4) -2.

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 91

Exercise 1

Consider the vector field $F(x,y,z) = (-z, 0, -y)$ and the parameterized surface

$X: [-1, 0] \times [0, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2 + 2uv, u, 2u^2)$

Compute $\int_X F.$

1) 0.666667 2) 3.06667 3) −2.63333 4) 3.56667

Exercise 2

Consider the vector field $F(x,y,z) = (0, z, -x)$ and the parameterized curve

$\sigma: [-1, 0] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (1 + 2t, 2t^2, 2)$

Compute $\int_\sigma F.$

1) −4. 2) 9.2 3) −15.6 4) −13.6

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 92

Exercise 1

Consider the vector field $F(x,y,z) = (-x, -y, -z)$ and the parameterized surface

$X: [0, 1] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (u + 2uv, u + 2u^2, 2 + v^2)$

Compute $\int_X F.$

1) 51.3333 2) -19.1667 3) -31.1667 4) 15.3333

Exercise 2

Consider the vector field $F(x,y,z) = (-y, -x, 0)$ and the parameterized curve

$\sigma: [0, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (1, t^2, 2)$

Compute $\int_\sigma F.$

1) 1.3 2) 2.1 3) -1. 4) -3.4

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 93

Exercise 1

Consider the vector field $F(x,y,z) = (-z, 0, 0)$ and the parameterized surface

$X: [0, 1] \times [-1, 0] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2u^2 + 2uv, 2u^2 + 2uv, 3u)$

Compute $\int_X F.$

1) -10.8 2) 14.4 3) 21.6 4) $6.$

Exercise 2

Consider the vector field $F(x,y,z) = (0, z, -y)$ and the parameterized curve

$\sigma: [0, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2t^2, 2t + 2t^2, 2 + 2t^2)$

Compute $\int_\sigma F.$

1) -10.1333 2) 15.0667 3) 22.2667 4) 6.66667

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 94

Exercise 1

Consider the vector field $F(x,y,z)=(-z,y,0)$ and the parameterized surface

$X:[0,1]\times[-1,0]\longrightarrow\mathbb{R}^3$

$X(u,v)=(2u^2,u^2+2v^2,2v)$

Compute $\int_X F.$

1) -2.66667 2) 9.33333 3) -14.6667 4) -0.266667

Exercise 2

Consider the vector field $F(x,y,z)=(-z,y,0)$ and the parameterized curve

$\sigma:[0,1]\longrightarrow\mathbb{R}^3$

$\sigma(t)=(3t^2,3t,4)$

Compute $\int_\sigma F.$

1) -7.5 2) 24.5 3) -39.5 4) -1.1

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 95

Exercise 1

Consider the vector field $F(x,y,z)=(0,0,x)$ and the parameterized surface

$X:[0,1]\times[-1,0]\longrightarrow\mathbb{R}^3$

$X(u,v)=(2uv,2u^2,2)$

Compute $\int_X F.$

1) -2.6 2) 2.8 3) $2.$ 4) 0.4

Exercise 2

Consider the vector field $F(x,y,z)=(y,z,-x)$ and the parameterized curve

$\sigma:[0,1]\longrightarrow\mathbb{R}^3$

$\sigma(t)=(2t^2,1+2t,t+t^2)$

Compute $\int_\sigma F.$

1) 6.26667 2) 1.46667 3) -4.53333 4) 4.66667

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 96

Exercise 1

Consider the vector field $F(x,y,z) = (-y, -z, x)$ and the parameterized surface

$X: [-1, 1] \times [-1, 0] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2 + 2u, 2v + 2v^2, 4u^2)$

Compute $\int_X F.$

1) 0. 2) 0.7 3) -4. 4) 0.3

Exercise 2

Consider the vector field $F(x,y,z) = (-y, 0, -x)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2t, 2, 1 + 2t^2)$

Compute $\int_\sigma F.$

1) -23.1333 2) -13.3333 3) 42.6667 4) -17.5333

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 97

Exercise 1

Consider the vector field $F(x,y,z) = (-z, -x, 0)$ and the parameterized surface

$X: [-1, 1] \times [-1, 0] \longrightarrow \mathbb{R}^3$

$X(u,v) = (2 + 2v^2, v, u + 2uv)$

Compute $\int_X F.$

1) 10.5333 2) −16.4667 3) −5.06667 4) −20.0667

Exercise 2

Consider the vector field $F(x,y,z) = (0, z, x)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (t, 2 + t^2, t + t^2)$

Compute $\int_\sigma F.$

1) −2.53333 2) 2.66667 3) 7.66667 4) 6.46667

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 98

Exercise 1

Consider the vector field $F(x,y,z) = (-x, z, -y)$ and the parameterized surface

$X: [-1, 1] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (u\,v, u + 2\,v^2, 2\,v + u\,v)$

Compute $\int_X F$.

1) 12.7 2) −10.4 3) 28.1 4) 27.

Exercise 2

Consider the vector field $F(x,y,z) = (z, x, 0)$ and the parameterized curve

$\sigma: [-1, 1] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2, t + 2\,t^2, 2 + t)$

Compute $\int_\sigma F$.

1) −4.4 2) 4. 3) −10. 4) −9.6

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 99

Exercise 1

Consider the vector field $F(x,y,z) = (z, x, 0)$ and the parameterized surface

$X: [-1, 0] \times [-1, 0] \longrightarrow \mathbb{R}^3$

$X(u,v) = (u\,v, 1 + v, 2\,v + u\,v)$

Compute $\int_X F.$

1) -2.56667 2) -0.466667 3) -1.56667 4) -0.166667

Exercise 2

Consider the vector field $F(x,y,z) = (-z, -y, -x)$ and the parameterized curve

$\sigma: [-1, 0] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2, 1, 2\,t)$

Compute $\int_\sigma F.$

1) -13.6 2) $-4.$ 3) -5.2 4) -9.6

Further Mathematics - Degree in Engineering - 2024/2025
04-Line and Surface Integral-Hand exam for serial number: 100

Exercise 1

Consider the vector field $F(x,y,z) = (z, 0, -y)$ and the parameterized surface

$X: [-1, 0] \times [-1, 1] \longrightarrow \mathbb{R}^3$

$X(u,v) = (u + u\,v, v + v^2, u^2 + u\,v)$

Compute $\int_X F.$

1) 12.1333 2) -3.46667 3) -9.46667 4) 2.13333

Exercise 2

Consider the vector field $F(x,y,z) = (-z, -y, 0)$ and the parameterized curve

$\sigma: [-1, 0] \longrightarrow \mathbb{R}^3$

$\sigma(t) = (2\,t, t + t^2, t)$

Compute $\int_\sigma F.$

1) 2.5 2) 1. 3) -0.4 4) -2.9