Assignment 2

The due date for submitting this assignment has passed.

Due on 2021-02-07, 23:59 GMT.

Exercise 1

Given the vector equation, solve for x, y, and z.

\[ \begin{align*}
\mathbf{a} + \mathbf{b} &= \mathbf{c} \\
\mathbf{d} &= \mathbf{e} \end{align*} \]

Answer:

1. \( x = 1 \)
2. \( y = -2 \)
3. \( z = 3 \)

Exercise 2

Find the determinant of the matrix.

\[ \begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc \]

Answer:

1. \( ad - bc \)

Exercise 3

Solve the system of equations.

\[ \begin{align*}
x + 2y &= 3 \\
3x - y &= 1 \end{align*} \]

Answer:

1. \( x = 1 \)
2. \( y = 1 \)

Exercise 4

Given the function \( f(x) = x^2 - 4 \), find the domain and range.

Answer:

1. Domain: \( (-\infty, \infty) \)
2. Range: \( [-4, \infty) \)

Exercise 5

Evaluate the definite integral.

\[ \int_{a}^{b} f(x) \, dx \]

Answer:

1. \( \frac{b^2 - a^2}{2} \)

Exercise 6

Find the limit as \( x \to 0 \).

\[ \lim_{x \to 0} \frac{\sin(x)}{x} \]

Answer:

1. 1

Exercise 7

Simplify the expression.

\[ \sqrt{x^2 - 9} \]

Answer:

1. \( |x - 3| \)

Exercise 8

Solve the inequality.

\[ 2x + 3 < 7 \]

Answer:

1. \( x < 2 \)

Exercise 9

Find the derivative of the function.

\[ f(x) = x^3 - 2x^2 + 3x - 4 \]

Answer:

1. \( f'(x) = 3x^2 - 4x + 3 \)

Exercise 10

Find the equation of the tangent line at the given point.

\[ f(x) = x^2 \] at \( x = 1 \)

Answer:

1. \( y = 2x - 1 \)

Exercise 11

Find the area of the region bounded by the curves.

\[ y = x^2 \] and \( y = x + 1 \)

Answer:

1. \( \frac{1}{2} \)

Exercise 12

Find the volume of the solid generated by revolving the region about the x-axis.

\[ y = x^2, \quad x = 0, \quad x = 2 \]

Answer:

1. \( \frac{8\pi}{3} \)

Exercise 13

Find the arc length of the curve.

\[ y = \sqrt{x} \] from \( x = 0 \) to \( x = 4 \)

Answer:

1. \( 4 \)

Exercise 14

Find the work done by the force field.

\[ \mathbf{F}(x, y) = (x, y) \] from \( (0, 0) \) to \( (2, 2) \)

Answer:

1. \( 2\sqrt{2} \)

Exercise 15

Find the center of mass of the lamina.

\[ \mathbf{F}(x, y) = (x, y) \] with mass density \( \rho(x, y) = x + y \)

Answer:

1. \( \left( \frac{1}{2}, \frac{1}{2} \right) \)

Exercise 16

Find the potential function.

\[ \mathbf{F}(x, y) = (x, y) \]

Answer:

1. \( \frac{x^2}{2} + \frac{y^2}{2} \)

Exercise 17

Find the partial derivatives.

\[ f(x, y) = x^2 + y^2 \]

Answer:

1. \( f_x(x, y) = 2x \)
2. \( f_y(x, y) = 2y \)

Exercise 18

Find the gradient.

\[ f(x, y) = x^2 + y^2 \]

Answer:

1. \( \nabla f(x, y) = (2x, 2y) \)

Exercise 19

Find the line integral.

\[ \int_C \mathbf{F} \cdot d\mathbf{r} \]

Answer:

1. \( 0 \)

Exercise 20

Find the divergence.

\[ \mathbf{F}(x, y, z) = (x, y, z) \]

Answer:

1. \( 3 \)

Exercise 21

Find the curl.

\[ \mathbf{F}(x, y, z) = (x, y, z) \]

Answer:

1. \( (0, 0, 0) \)

Exercise 22

Find the line integral.

\[ \int_C \mathbf{F} \cdot d\mathbf{r} \]

Answer:

1. \( 0 \)

Exercise 23

Find the surface integral.

\[ \iint_S \mathbf{F} \cdot d\mathbf{S} \]

Answer:

1. \( 0 \)

Exercise 24

Find the volume integral.

\[ \iiint_V f(x, y, z) \, dV \]

Answer:

1. \( 0 \)

Exercise 25

Find the flux of \( \mathbf{F} \) through the closed curve.

\[ \mathbf{F}(x, y, z) = (x, y, z) \]

Answer:

1. \( 0 \)

Exercise 26

Find the divergence of \( \mathbf{F} \).

\[ \mathbf{F}(x, y, z) = (x, y, z) \]

Answer:

1. \( 3 \)

Exercise 27

Find the curl of \( \mathbf{F} \).

\[ \mathbf{F}(x, y, z) = (x, y, z) \]

Answer:

1. \( (0, 0, 0) \)

Exercise 28

Find the work done by the force field.

\[ \mathbf{F}(x, y, z) = (x, y, z) \] from \( (0, 0, 0) \) to \( (1, 1, 1) \)

Answer:

1. \( 3 \)

Exercise 29

Find the line integral.

\[ \int_C \mathbf{F} \cdot d\mathbf{r} \]

Answer:

1. \( 0 \)

Exercise 30

Find the surface integral.

\[ \iint_S \mathbf{F} \cdot d\mathbf{S} \]

Answer:

1. \( 0 \)

Exercise 31

Find the volume integral.

\[ \iiint_V f(x, y, z) \, dV \]

Answer:

1. \( 0 \)

Exercise 32

Find the flux of \( \mathbf{F} \) through the closed curve.

\[ \mathbf{F}(x, y, z) = (x, y, z) \]

Answer:

1. \( 0 \)