

Panel 1

HW Find a conservative vector field that has the given potential:
 $f(x, y, z) = \sin(x^2 + y^2 + z^2)$

Find $\text{div}(\nabla \cdot F)$ and $\text{curl}(F) = \nabla \times F$
 $F(x, y, z) = \langle x^2z, y^2x, y + 2z \rangle$

\rightarrow Evaluate $\int_C (x - y)dx + xdy$ if C is the graph of $y^2 = x$ from $(4, -2)$ to $(4, 2)$

Find the work done by $F(x, y, z)$ along the curve $\langle t, t^2, t^3 \rangle$ from $(0, 0, 0)$ to $(2, 4, 8)$, where
 $F(x, y, z) = \langle y, z, x \rangle$

\updownarrow Check which of the following vector fields is not conservative.
 $F(x, y) = \langle 3x^2y + 2, x^3 + 4y^3 \rangle$
 $F(x, y) = \langle e^x, 3 - e^x \sin(y) \rangle$
 $F(x, y, z) = \langle 8xz, 1 - 6yz^2, 4x^2 - 9y^2z^2 \rangle$

\updownarrow Show that the line integrals are independent of the path, and find their value:
 $\int_{(-1, 2)}^{(3, 11)} (y^2 + 2xy)dx + (x^2 + 2xy)dy$
 $\int_{(1, 0, 2)}^{(-2, 1, 3)} (6xy^3 + 2z^2)dx + (9x^2y^2)dy + (4xz + 1)dz$

1

Panel 2

Evaluate $\oint_C (3y - e^{\sin(x)})dx + (7x + \sqrt{y^4 + 1})dy$
 where C is the circle $x^2 + y^2 = 9$

2

Panel 3

15. Evaluate $\int_C 2(x+y)dx + 2(x+y)dy$, C curve from $(-2,-2)$ to $(4,3)$

16. Find the work done by the force field $F = \langle 9x^2y^2, 6x^3y - 1 \rangle$ from $P(0,0)$ to $Q(5,9)$

3

Panel 4

18. Evaluate $\oint_C 2xydx + (x+y)dy$ where C bounds the region between $y=0$ and $y=4-x^2$.

21. Evaluate $\oint_C x \sin(y^2) - y^2 dx + (x^2 \cos(y^2) + 3x) dy$ where C is the boundary of the trapezoid with vertices $(0, -2)$, $(1, -1)$, $(1, 1)$, and $(0, 2)$.

4