

NAME: _____

SECTION: _____

1. Compute the work performed in moving a particle along the path $c(t) = (\cos(2t), \sin(2t), t)$, $0 \leq t \leq \pi/4$ by the force $\mathbf{F} = \langle 2yz, xz, 4xy \rangle$.

ANSWER: $\frac{1}{32}(20 - \pi^2)$.

2. Let $\mathbf{F} = \langle 3 + 4xyz, 2x^2z - y, 2x^2y \rangle$. Compute $\int_C \mathbf{F} \cdot ds$ where C is the segment joining the points $A=(1,0,1)$ and $B=(0,0,2)$ together with the quarter circle centered at the origin and joining the points B and $C=(0,2,0)$. The integration is performed from A to C .

ANSWER: -5

3. Determine if the vector field $\mathbf{F} = \langle y + \cos x, x + e^{\sin y} \cos y, \cos z \rangle$ is conservative and if so find a potential.

ANSWER: $xy + \sin x + e^{\sin y} + \sin z$

4. Use the Green theorem to find the integral $\oint_C (y + e^x \ln y) dx + \frac{e^x}{y} dy$ where C is the boundary of the region bounded above by $y = 4 - x^2$ and below by $y = x^4 + 2$ oriented counter clockwise.

ANSWER: -44/15

5. Use the Green theorem to calculate the integral $\oint_C \mathbf{F} \cdot ds$ where C is the circle $(x-4)^2 + (y-1)^2 = 1$ oriented counterclockwise and $\mathbf{F} = \langle x^3 \arctan x, x^2 + \cos(y^3) \rangle$.

ANSWER: 8π .