Exam

Name___________________________________

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find the gradient field of the function.

1) $f(x, y, z) = \dfrac{xz + xy + yz}{xyz}$ 1) _______

A) $\nabla f = -\dfrac{1}{x^2}i - \dfrac{1}{y^2}j - \dfrac{1}{z^2}k$

B) $\nabla f = -\dfrac{1}{x^2yz}i - \dfrac{1}{xy^2z}j - \dfrac{1}{xyz^2}k$

C) $\nabla f = \dfrac{1}{x^2}i + \dfrac{1}{y^2}j + \dfrac{1}{z^2}k$

D) $\nabla f = \dfrac{1}{x^2yz}i + \dfrac{1}{xy^2z}j + \dfrac{1}{xyz^2}k$

Calculate the flux of the field F across the closed plane curve C.

2) $F = xi + yj$; the curve C is the circle $(x + 5)^2 + (y - 9)^2 = 81$ 2) _______

A) 2π B) $162\pi - 45$ C) 0 D) 162π

Find the potential function f for the field F.

3) $F = (y - z)i + (x + 2y - z)j - (x + y)k$ 3) _______

A) $f(x, y, z) = x(y + y^2) - xz - yz + C$

B) $f(x, y, z) = x + y^2 - xz - yz + C$

C) $f(x, y, z) = xy + y^2 - xz - yz + C$

D) $f(x, y, z) = xy + y^2 - x - y + C$

Evaluate. The differential is exact.

4) $\displaystyle\int_{(0, 0, 0)}^{(4, 6, 2)} (2xy^2 - 2xz^2)\, dx + 2x^2y\, dy - 2x^2z\, dz$ 4) _______

A) 0 B) 1024 C) 512 D) 640

Using Green's Theorem, find the outward flux of F across the closed curve C.

5) $F = -\sqrt{x^2 + y^2}\,i + \sqrt{x^2 + y^2}\,j$; C is the region defined by the polar coordinate inequalities $1 \le r \le 4$ and $0 \le \theta \le \pi$ 5) _______

A) 17 B) 30 C) 0 D) 15