TPHS Calculus D — SDSU Math 252 Name. _____

Quiz–Chapter 16 (16.1-16.5) _____ Per.: _____

No calculators. 3 points each. 15 pts.

Circle the correct answer for each problem. Form B

1. Let $\mathbf{F}(x, y, z) = \cos x\,\mathbf{i} + \sin y\,\mathbf{j} + e^{xy}\,\mathbf{k}$. Calculate **curl F** at the point (1, 1, 1).

   $\cos 1 - \sin 1$ $\quad e\,\mathbf{i} - e\,\mathbf{j}$ $\quad -\frac{\pi}{2}$

   $e\,\mathbf{i} + e\,\mathbf{j}$ $\quad$ None of these

2. Use the Fundamental Theorem of Line Integrals to evaluate $\int_C (y^2 - 3x^2)\,dx + (2xy + 2)\,dy$, where C is a smooth curve from (1, 1) to (−1, 0).

   -2 $\quad -1$ $\quad 0$

   1 $\quad$ None of these

3. Let $\mathbf{F}(x, y, z) = (2xy + z^2)\,\mathbf{i} + x^2\,\mathbf{j} + (2xz + \pi\cos\pi z)\,\mathbf{k}$. Find the potential function of **F**.

   $2x^2y + 2xz^2 + \sin\pi z + C$ $\quad x^2y + xz^2 + \sin\pi z + C$

   $2x^2y + 2xz^2 - \pi\sin\pi z + C$ $\quad x^2y + xz^2 - \sin\pi z + C$

   None of these

4. Let C be the triangular path from (0, 0) to (1, 1) to (0, 1) and back to (0, 0). Then $\int_C 2y\,dx - 3x\,dy$ is equal to which of the following?

   $\int_0^1\int_0^y [2 - (-3)]dx\,dy$ $\quad \int_0^1\int_0^1 [2 - (-3)]dx\,dy$

   $\int_0^1\int_0^y [(-3) - 2]dx\,dy$ $\quad \int_0^1\int_0^1 [(-3) - 2]dx\,dy$

   None of these

5. A particle moves upward along the circular helix parametrized by $\mathbf{r}(t) = (\cos t)\,\mathbf{i} + (\sin t)\,\mathbf{j} + t\,\mathbf{k}$ for $0 \le t \le 2\pi$ under a force given by $\mathbf{F}(x, y, z) = (-zy)\,\mathbf{i} + (zx)\,\mathbf{j} + (xy)\,\mathbf{k}$. Find the work done on the particle by the force.

   $2\pi^2 + 1$ $\quad 2\pi^2$ $\quad 0$

   $\frac{1}{2}$ $\quad$ None of these

Bonus Use Green's Theorem to calculate $\int_C \mathbf{F}\cdot d\mathbf{r}$ where $\mathbf{F}(x, y) = (-16y + \sin x^2)\,\mathbf{i} + (4e^y + 3x^2)\,\mathbf{j}$ and $C = C_1 + C_2 + C_3$ as shown.

$2\sqrt{3} + 8\pi$ $\quad 4\pi$ $\quad 8\pi$

$2\sqrt{3} + 4\pi$ $\quad$ None of these