University of Connecticut
Department of Mathematics

MATH 2110Q PRACTICE EXAM 2 SPRING 2017

NAME: _____

DISCUSSION SECTION: _____

Read This First!

- Read the questions and instructions carefully.
- The available points for each problem are given in brackets.
- You must show your work to obtain full credit (and to possibly receive partial credit). **Correct answers with no justification will not receive credit.**
- Make sure your answers are clearly indicated, and cross out any work you do not want graded.
- Do not leave any blanks! Even if you do not arrive at an answer, show as much progress towards a solution as you can, and explain your reasoning.
- Calculators are not allowed.

Grading - For Administrative Use Only

Page:	1	2	3	4	5	Total
Points:	11	11	7	8	13	50
Score:						

1. Compute the arc length of the curve given by $\vec{r}(t) = \langle \frac{4}{3}t^{3/2}, \frac{1}{2}t^2 - 2t, \frac{4}{3}t^{3/2} \rangle$ from $t = 1$ to $t = 2$. [5]

2. Compute the line integral of $\vec{F} = \langle y - x, x^3 \rangle$ over the portion of the curve $y = x^2$ from $(-1, 1)$ to $(1, 1)$. [6]

3. Set up but **do not evaluate** a triple integral **in cylindrical coordinates** to find the volume enclosed between the xy-plane and $z = 2(x^2 + y^2) + 3$ over the region D in the *second quadrant* enclosed by $x^2 + y^2 = 25$ using cylindrical coordinates. [5]

4. Set up but **do not evaluate** a triple integral **in Cartesian coordinates** to find the volume enclosed between $y = 0$, $z = 0$, $y = \sqrt{x}$ and $z = 1 - x$. [6]

5. Compute the line integral of $f(x, y) = 4xy$ over the line segment from $(1, -2)$ to $(3, 0)$. [7]

6. Let C be the path consisting of the line segment from $(0,0)$ to $(1,1)$, followed by the portion of the circle of radius $\sqrt{2}$ traced counterclockwise from $(1,1)$ to $(1,-1)$, followed by the line segment from $(1,-1)$ back to $(0,0)$. Sketch C, then use Green's Theorem to compute the line integral of $\vec{F} = \langle x^2 - xy, e^{\cos y} \rangle$ over C. [8]

7. Let $\vec{F} = \langle 3x^2 - 2xy + 5, y^3 - x^2 \rangle$ be a vector field.

   (a) Find a potential function f so that $\vec{F} = \vec{\nabla} f$. [3]

   (b) If C is the circle $(x-2)^2 + (y+4)^2 = 9$ traced once clockwise, find the value of the line integral $\displaystyle\int_C \vec{F} \cdot d\vec{r}$. [2]

8. Write the following integral using **spherical coordinates** if the solid E is bounded below by $z = \sqrt{x^2 + y^2}$ and above by $z = 1$. **Do not evaluate**. [8]

$$\iiint_E y^2 z \, dV$$