University of Connecticut
Department of Mathematics

MATH 2110Q | PRACTICE EXAM 2 | FALL 2016

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 allowed, but models that can do symbolic computations (TI-89 and above, including TI-NSpire) are not allowed.

Grading - For Administrative Use Only

Page:	1	2	3	4	5	Total
Points:	15	10	8	7	10	50
Score:						

1. Find and classify all critical points for the function $f(x, y) = \frac{1}{2}y^2 - \frac{1}{3}x^3 - xy + 2x + 5$ [8]

2. Reverse the order of integration for the iterated integral [7]

$$\int_0^2 \int_{x^2}^{2x} f(x, y)\, dy\, dx.$$

3. Fill in the missing blanks in the following chart. [10]

Surface	Cartesian	Cylindrical	Spherical
Sphere	$x^2 + y^2 + z^2 = 16$		
Cone			$\phi = \frac{\pi}{4}$
	$x = 3$		$\rho \sin\phi \cos\theta = 3$
Paraboloid		$z = r^2$	
		$r = 1$	$\rho = \csc\phi$

4. Set up a triple integral that could be used to compute the volume contained between the xy-plane and the surface $z = 2(x^2 + y^2) + 3$ over the region D in the *second quadrant* enclosed by $x^2 + y^2 \leq 25$ using

   (a) Cartesian coordinates. [4]

   (b) Cylindrical coordinates. [4]

5. Let D be the region in the xy-plane enclosed by $y = x$, $y = -x$, and $x^2 + y^2 = 8$, assuming $x \geq 0$. Sketch the region D and use a double integral in **polar coordinates** to compute the area of D. [7]

6. Write the following integral using **spherical coordinates** if the region E is bounded below by $z = \sqrt{x^2 + y^2}$ and above by $z = 1$. **Do not evaluate**. [10]

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