Math 2210 - Quiz 2

University of Utah

Summer 2007

Name: ________________________________

1. (10 points)

   Calculate the following double integrals.

   (a) (3 points)

   $$\int_{-1}^{4}\int_{1}^{2}(x+y^2)dydx$$

   (b) (3 points)

   $$\int_{\frac{1}{2}}^{1}\int_{0}^{2x}\cos(\pi x^2)dydx$$

(c) (4 points)

$$\int_0^{\pi}\int_0^{1-\cos\theta} r\sin\theta dr d\theta$$

2. (10 points)

   Evaluate the given integrals using either cartesian or polar integration, whichever works best for the given problem, and sketch the domain of integration. (Hint: Make the sketch first.)

   (a) (5 points)
   $\int\int_S (x^2 - xy) dA$;
   S is the region between $y = x$ and $y = 3x - x^2$.

   (b) (5 points)
   $\int_0^1 \int_0^{\sqrt{1-y^2}} \sin{(x^2 + y^2)} dx dy$

3. (10 points)

   For the solid bounded by the cylinder $x^2 + y^2 = 9$ and the planes $z = 0$ and $z = 4$ calculate:

   (a) (3 points)
   The volume of the solid.

   (b) (3 points)
   The mass of the solid assuming the density is given by:

$$\rho(x, y, z) = 2(x^2 + y^2 + z^2)$$

(c) (4 points)

The center of mass of the solid with the above density function. (Note: You should only have to calculate one of the three center of mass coordinates here. The other two should be obvious, but you should say *why* they're obvious.)

4. (10 points)

Calculate the following quantities:

(a) (5 points)

The surface area of the part of the surface $z = \dfrac{x^2}{4} + 4$ that is cut off by the planes $x = 0$, $x = 1$, $y = 0$, and $y = 2$.

(b) (5 points)

The area in the first quadrant between the curves defined by the equations $x^2 + y^2 = 36$ and $x^2 - 6x + y^2 = 0$. (Note - You should do this problem as a double integral in polar coordinates. Any other argument will not receive full credit.)

5. (10 points)

Evaluate the integral $\int_{-\infty}^{\infty} e^{-\frac{(x-\mu)^2}{2\sigma^2}} dx$.

(Note - You must provide a formal evaluation of any integral. For full credit you can't just quote a result from the textbook or from lecture, you must rederive the result. Also, your final answer may be in terms of μ and σ.)