Math 114. Fall 2014. HW 6. Due Nov 12 Wednesday

Instructions for written homework.

- You are encouraged to work with others on these problems. You are expected to write the solutions yourself.
- Your solutions should be legible and well organized. **Graders will deduct points for solutions that are difficult to read, or are disorganized.** For the benefit of the grader, please turn in solutions to problems in the assigned order, i.e. #1, then #2, then #3, etc.
- Staple your pages together. Do not turn in notebook paper with tattered edges. **Homework that is unstapled or is lacking a name will not be graded.**

Problem 1. What is the area of the region in the plane bounded by the curve given in polar coordinates by

$$r = 4 + 2\cos(2\theta).$$

Problem 2 (Fall 2011)**.** Find the volume of the solid R bounded by the surface given in spherical coordinates by the equation

$$\rho = (\sin\phi)^{1/3}$$

Problem 3 (Spring 2011)**.** Find the volume of the solid bounded above by the paraboloid

$$z = 5 - x^2 - y^2$$

and below by the paraboloid

$$z = 4x^2 + 4y^2.$$

Problem 4 (Spring 2011)**.** Compute the volume of the solid bounded by the four surfaces $x + z = 1$, $x + z = -1$, $z = 1 - y^2$, and $z = y^2 - 1$.

Problem 5 (Fall 2010)**.** Find the volume of the region R inside the sphere of radius 2 and above the cone

$$\sqrt{3}z = \sqrt{x^2 + y^2}.$$

Problem 6 (Spring 2013)**.** Compute the integral

$$\int_0^1 \int_0^{2-2x} \frac{(2x-y)^2}{2x+y}\,dydx$$

Hint: A change of variable might help.

Problem 7 (Fall 2010)**.** Find the volume inside the cylinder

$$x^2 + y^2 = 1,$$

below the plane

$$x + y + z = 2,$$

above the xy plane, and in the first octant.

Problem 8 (Fall 2010)**.** Evaluate

$$\iint_S (x+y)e^{x^2-y^2}\,dA$$

where S is the rectangle with vertices $(1,0), (0,1), (-1/2, 1/2)$ and $(1/2, -1/2)$. Note that $x^2 - y^2 = (x+y)(x-y)$.

Problem 9 (Fall 2011)**.** Evaluate the integral

$$\iint_R \cos\left(\frac{x-y}{x+y}\right)\,dA,$$

where R is the triangle in the xy-plane with vertices $(0,0), (2,2)$, and $(2+\pi, 2-\pi)$.