

MATH 13, WINTER 2011
WRITTEN HOMEWORK #3

JOHANNA N.Y. FRANKLIN

This assignment will be due on **Friday, January 28** at 12:30 p.m. in the boxes outside 105 Kemeny. Look for the column of boxes labeled "Math 13, Winter 2011" and put your assignment in the left ("IN") column corresponding to the first letter of your family name (A-F, G-M, N-S, T-Z).

Remember to show your work. A correct answer with no work shown will receive minimal credit. Your solutions should be detailed enough that any of your classmates could understand them simply by reading them.

- (1) (16.2, #36) Find the average value of $f(x, y) = e^y \sqrt{x + e^y}$ over the rectangle $R = [0, 4] \times [0, 1]$.

- (2) (16.3, #58) In evaluating a double integral over a region D , a sum of iterated integrals was obtained as follows:

$$\iint_D f(x, y) dA = \int_0^1 \int_0^{2y} f(x, y) dx dy + \int_1^3 \int_0^{3-y} f(x, y) dx dy$$

Sketch the region D and express the double integral as an iterated integral with reversed order of integration.

- (3) (16.4, #22) Use polar coordinates to find the volume of the solid inside the sphere $x^2 + y^2 + z^2 = 16$ and outside the cylinder $x^2 + y^2 = 4$.
- (4) Let D_1 be a circle whose radius is 3 and whose center is $(-5, 0)$.
- (a) Let D_2 be a circle whose radius is 3 and whose center is the origin. What is the relationship between $\iint_{D_1} xy dA$ and $\iint_{D_2} (x - 5)y dA$? Explain your answer.
- (b) Evaluate $\iint_{D_2} (x - 5)y dA$ using polar coordinates.