

MATH 13, FALL '16

HOMEWORK 2

Due Wednesday, September 28

Write your answers neatly and clearly. Use complete sentences, and label any diagrams. List problems in numerical order and staple all pages together. Start each problem on a new page. Please show your work; no credit is given for solutions without work or justification.

Remember that you may discuss the problems with classmates, but all work should be your own. List the names of anybody with whom you discussed the problems at the top of the page.

1.
 - a) Use double integrals to find the volume of the figure enclosed by the planes $z = 0$, $y = 0$, $y = 2x$, and $4x + 2y + z = 6$.
 - b) What is the average height (i.e., z -value) of a point in this 3D region?
2.
 - a) Plot the function $r = \cos(3\theta)$ for $0 \leq \theta \leq 2\pi$.
 - b) Let C_1 be the circle with radius 1 centered at $(0,0)$ and let C_2 be the circle with radius 2 centered at $(2,0)$. Express the region that lies inside C_2 and outside C_1 in polar coordinates.
 - c) Set up, but *do not evaluate*, the integral of the function $f(x,y) = x + 2y$ over the region in part (b) above.
3. Use polar integration to find the volume of the figure above the xy -plane, under the paraboloid $z = 2x^2 + y^2$, and inside the cylinder $x^2 + y^2 = 2y$.
4. Find the integral of the function $xy + z$ over the region bounded by the surfaces $x = y^2$, $x = 1$, $z = x$, and $z = -x$.