# MA 213 Worksheet #17

Sections 15.3
10/25/18

**1** *15.3.5* Sketch the region whose area is given by the integral and evaluate the integral:

$$\int_{\pi/4}^{3\pi/4} \int_{1}^{2} r \, dr \, d\theta$$

**2** *15.2.7,9* Evaluate the given integral by changing to polar coordinates.

(a) $\iint_D x^2 y \, dA$, where $D$ is the top half of the disk with center the origin and radius 5.

(b) $\iint_R \sin(x^2 + y^2) \, dA$, where $R$ is the region in the first quadrant between the circles with center the origin and radii 1 and 3.

**3** *15.2.17* Use a double integral to find the area of the region inside the circle $(x-1)^2 + y^2 = 1$ and outside the circle $x^2 + y^2 = 1$.

**4** *15.2.23* Use polar coordinates to find the volume of the sphere of radius $a$. (How might you check your answer to this?)

**5** *15.2.35* A swimming pool is circular with a 40 ft diameter. The depth is constant along east-west lines and increases linearly from 2 ft at the south end to 7 ft at the north end. Find the volume of water in the pool.

**6 Review from 15.2:** *15.2.35,37* Find the volume of the solid by subtracting two volumes.

(a) The solid enclosed by the parabolic cylinders $y = 1 - x^2$, $y = x^2 - 1$ and the planes $x + y + z = 2$, $2x + 2y - z + 10 = 0$.

(b) The solid under the plane $z = 3$, above the plane $z = y$, and between the parabolic cylinders $y = x^2$ and $y = 1 - x^2$.