Directions: Work two problems from 1, 2, 3 and two problems from 4, 5, 6. One hundred points total, each problem is worth 25 points.

1. Calculate the area of the region in the $xy$-plane bounded by the parabolas $y = x^2$ and $x = y^2$.

2. Set up an integral for the volume of the solid of revolution generated by revolving the region of problem 1 about the line $y = 1$. DO NOT EVALUATE THE INTEGRAL.

3. Consider the region $R$ between the graph of $y = \cos x$ for $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$ and the $x$-axis. Set up an integral for the the solid of revolution generated by revolving the region $R$ about the $y$-axis. DO NOT EVALUATE THE INTEGRAL.

4. Calculate the work done in compressing a spring one foot from its equilibrium position, given that it requires a force of one pound to compress the spring one-half foot from its equilibrium position.

5. A spherical tank with radius 5 feet is half full of water. Set up an integral for the work done in pumping all the water through a hole at the top of the tank. (The density of water is 62.4 lb/ft$^3$. DO NOT EVALUATE THE INTEGRAL.

6. Set up the integrals required for calculation of the $x$-coordinate of the center of mass of the disk $x^2 + y^2 \leq 1$ if the density function is $\delta(x) = 2 + x$. DO NOT EVALUATE THE INTEGRALS.