Math 121 Practice Problem Set 1
(Based on Sections 7.1–7.6)

1. Find the area of the surface obtained by rotating the curve $y = \sqrt{x}$, $0 \leq x \leq 6$ about the x-axis.

2. Find the mass and centre of mass of a semicircular plate occupying the region $x^2 + y^2 \leq a^2$, $y \geq 0$, if the density at distance s from the origin is ks g/cm^2.

3. The curve $y = e^{-kx} \sin x$, $(x \geq 0)$ is revolved about the x-axis to generate a string of "beads" whose volumes decrease to the right if $k > 0$. Find the total volume of all the beads as a function of k.

4. Find the length of the curve $y = \ln \cos x$ from $x = \pi/6$ to $x = \pi/4$.

5. Find the area of the curved surface of a right-circular cone of base radius r and height h by rotating the straight line segment from $(0, 0)$ to (r, h) about the y-axis.