Present neatly on separate paper. Justify for full credit. No Calculators.
Name _____Score _____ 40 minutes **Weight: x10**

1) Each integral represents the volume of a solid. Describe the solid in as much detail as possible!

     a)

$$\int_0^{\pi/2} 2\pi x \cos x \, dx$$

     b)

$$\int_0^{\pi/2} 2\pi \cos^2 x \, dx$$

2)

The base of a solid is a square with vertices located at $(1,0), (0,1), (-1,0)$, and $(0,-1)$. Each cross-section perpendicular to the x-axis is a semicircle. Find the volume of the solid.

3) Find the area of the region bounded by the given curves.

$$y = 1 - 2x^2, \quad y = |x|$$

4) Find the volume of the solid obtained by rotating the region bounded by the given curves about the specified axis.

$$x = 1 + y^2, \ y = x - 3; \quad \text{about the } y\text{-axis}$$

5)

Find the volumes of the solids obtained by rotating the region bounded by the curves $y = x$ and $y = x^2$ about the following lines.
(a) The x-axis   (b) The y-axis   (c) $y = 2$

6) Find the volume of the solid obtained by rotating the region bounded by the given curves about the x-axis.

$$x + y = 3, \quad x = 4 - (y - 1)^2$$