Math 112-3
Test 2
Friday, February 6, 1998

Name:____
SSN:____

SHOW ALL WORK ! UNSUPPORTED ANSWERS WILL RECEIVE LESS THAN HALF CREDIT.

1. (12pts) a. Sketch the region bounded by $y = 4 - x^2$ and $y = 3x$ and find its area (using integration with respect to x.)

b. SET UP a definite integral with respect to y that describes the area of this region.

2. (12pts) A pyramid with square base has height 50 feet (measured from the tip of the pyramid to the center of its square base) and its base has edge length 75 feet. Find the volume of the pyramid by integrating its cross-sectional area.

3. (12pts) Consider the region in the plane bounded by the curves $y = 4x$, $y = 4x^2$ and $x = 0$.

   a. Find the volume of the region obtained by rotating this region about the x-axis.

   b. Find the volume obtained by rotating this region about the line $x = 1$.

4. (12pts) Find the length of the curve $y = 3x^{3/2} - 1$ from $x = 0$ to $x = 1$.

5. (12pts) Find the area of the surface generated by rotating the curve $x = 9y + 1$ for $0 \leq y \leq 2$ about the y-axis.

6. (12pts) A cone-shaped water tank is 20 feet in diameter across the top and 15 feet deep. If the tank is filled to a depth of 10 feet, how much work is required to pump all the water to the top of the tank. Note: The density of water is 62.4 pounds per cubic foot. JUST SET UP THE INTEGRAL. DO NOT CARRY OUT THE INTEGRATION!

7.(12pts) Find the centroid (= center of mass assuming constant density) of the region bounded by $y = x^2$ and $y = 1 - x^2$. JUST SET UP THE INTEGRALS. DO NOT CARRY OUT THE INTEGRATION!