NAME:

INSTRUCTIONS: Answer the questions in the space provided. Show all your work: even a correct answer may receive little or no credit if a method of solution is not shown. Water has a density of $1000 \frac{\text{kg}}{\text{m}^3}$. The acceleration of gravity is $9.8 \frac{\text{m}}{\text{s}^2}$.

1. Find the area of the region enclosed by the curve $y = x^2 - 2x - 1$ and the line y = x - 1.

2. The base of a solid S is the region between $x = y^2$ and x = 1. Cross-sections of S perpendicular to the y-axis are squares. Find the volume of S.

3. Find the volume of the solid formed by rotating about the the line x = -2 the region enclosed by $y = x^2$ and y = x+2. Express your answer as an integral but **do not evaluate the integral**.

4. Find the volume of the solid formed by rotating about the line x = -1 the region enclosed by $x = 1 - y^2$ and the *y*-axis. Express your answer as an integral but **do not evaluate the integral**.

5. Calculate the arc length of the curve $y = \frac{2}{3}x^{\frac{3}{2}} + 4$ for $0 \le x \le 3$.

6. Find the x-coordinate of the centroid of the region enclosed by $y = 2x - x^2$ and the x-axis. It may be useful to know that the area of the region is $\frac{4}{3}$.

7. Calculate the hydrostatic force against the triangle shown when it is submerged in water so that it's top edge is at the surface.



8. A 500 lb wrecking ball hangs from a 40 ft chain with linear density 4 lb/ft attached to a crane. How much work is done if the crane lifts the ball 20 ft by drawing in the chain?