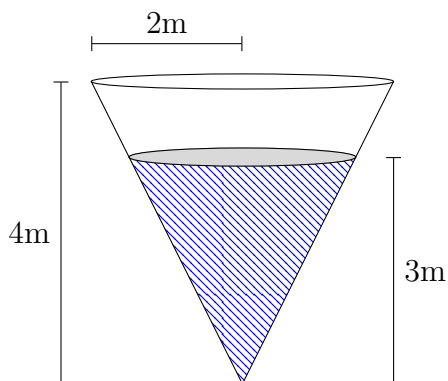


Math 2300-007: Quiz 6

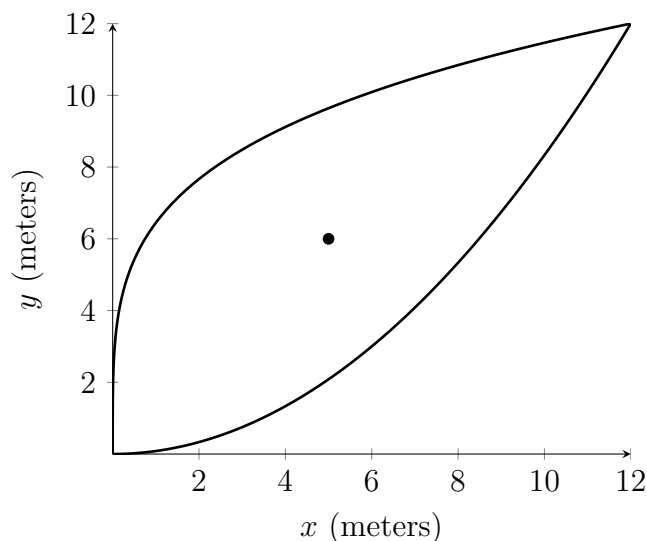
Name: _____

Score: _____

1. (1 point) Write down a formula for work in terms of force and distance.
2. (1 point) In a sentence or two, describe your plan for solving the problem below.
3. (5 points) Water is pumped from the top of a conical tank of height 4 meters and base radius 2 meters depicted below. How much work is required to empty the tank of water if the initial height of the water is 3 meters? You may assume that the mass of water on Earth is 1000 kilograms per cubic meter and that $g = 9.8 \frac{\text{m}}{\text{sec}^2}$ is the acceleration due to gravity on Earth. (**Set up, but do not evaluate the integral.**)



4. The lamina depicted below has centroid $(5, 6)$ and mass density $\rho = 1$ kilogram per square meter. Suppose M_x is the moment of the system about the x -axis and M_y is the moment of the system about the y -axis.



Use the figure provided to answer the following questions. For each question, choose the best answer.

- (a) (1 point) If the density is changed from $\rho = 1$ kg/m² to $\rho = 2$ kg/m², then:
- (i) M_x increases, M_y increases, and the centroid stays at $(5, 6)$;
 - (ii) M_x increases, M_y decreases, and the centroid stays at $(5, 6)$;
 - (iii) M_x increases, M_y increases, and the centroid moves to the right of $(5, 6)$;
 - (iv) M_x decreases, M_y increases, and the centroid moves to the left of $(5, 6)$;
 - (v) M_x decreases, M_y decreases, and the centroid stays at $(5, 6)$.
 - (vi) M_x and M_y do not change, and the centroid stays at $(5, 6)$.
- (b) (1 point) If a point mass of 3 kg is added to the system at the point $(7, 6)$, then:
- (i) M_x increases, M_y does not change, and the centroid stays at $(5, 6)$;
 - (ii) M_x increases, M_y decreases, and the centroid stays at $(5, 6)$;
 - (iii) M_x increases, M_y increases and the centroid moves to the right of $(5, 6)$;
 - (iv) M_x decreases, M_y does not change and the centroid moves to the left of $(5, 6)$;
 - (v) M_x and M_y do not change, and the centroid stays at $(5, 6)$.