1. The figure at right shows a water tank in the shape of a truncated cone. The height of the tank is 5 meters. The base is a circle of radius 3 meters, and the top is a circle of radius 2 meters.

(a) Find the volume of water in the tank. Include units in your answer.

(b) Find the work done to drain the tank by siphoning all the water from the top of the tank.

(Hint: Remember that this tank is part of a cone, and consider using similar triangles. Be patient: there are a number of steps in the solution to this question. Remember that the density of water is $1000 \text{ kg/m}^3$ and the acceleration due to gravity is $9.8 \text{ m/s}^2$.)

2. A vertical plate is submerged in water and has the shape indicated in the figure at right. Calculate the hydrostatic force against the side of the plate.

3. A thin metal plate of uniform density $\rho = 2$ occupies the region in the first quadrant below the curve $y = 6 + x - x^2$.

(a) Find the mass of the plate.

(b) Find $M_y$, the moment of the plate around the $y$-axis.

(c) Find $M_x$, the moment of the plate around the $x$-axis.

(d) Find the coordinates $(\bar{x}, \bar{y})$ of the center of mass of the plate.

Practice Problems

Do not turn these in.

Section 6.5, # 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 33, 35, 37, 39