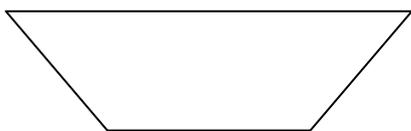


Math 252 Lab #6 More Integration Stuff Name: _____

(80 points) Please work in groups of 2-4. Show work on a separate paper, in pencil please, and staple it to this one, please write the answers here, in pencil:

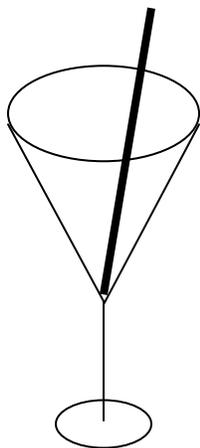
1. (10pts) There is a fish ladder on the N. Umpqua River that allows visitors to view fish through a window as they swim upstream. The window is trapezoidal with the top of the window 16 feet wide, the bottom of the window is 12 feet wide, and the window is 4 feet tall. The top of the window is 2 feet below the surface of the river. The force on any particular horizontal slice is given by $F = (\text{density})(\text{depth})(\text{area})$. Find the fluid force against this window given that the density of this water is 64 lbs/ft^3 .



Force is: _____

2. (10pts) Below is a glass that is used to drink certain beverages. The glass is in the shape of an inverted cone with a radius of 10 cm across the top. The glass is 20 cm tall (not including the stem and base) and the beverage comes to within 2 cm of the top. Find the work required to drink this drink through the straw if the straw is 30 cm long and the density of the beverage is 1.2 gr/cm^3 .

Work = Force x distance = mass·g·distance = $\rho \cdot \text{volume} \cdot g \cdot \text{distance}$

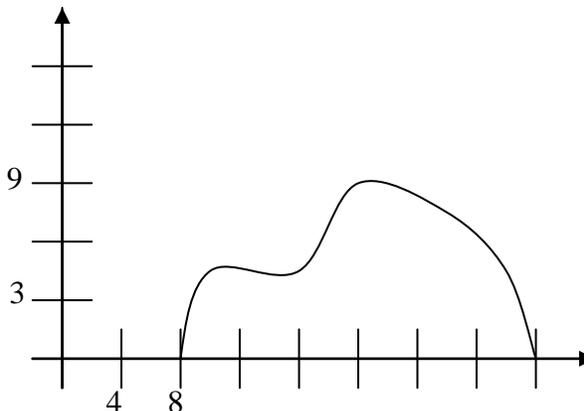


Work is: _____

3. (10pts) Find the resulting volume if the blob below is rotated about the:

a) x-axis
Volume is: _____

b) y-axis
Volume is: _____



4. (20pts) Consider the region bounded by: $y = \sqrt{x}$, $y = 3$, $x = 0$.

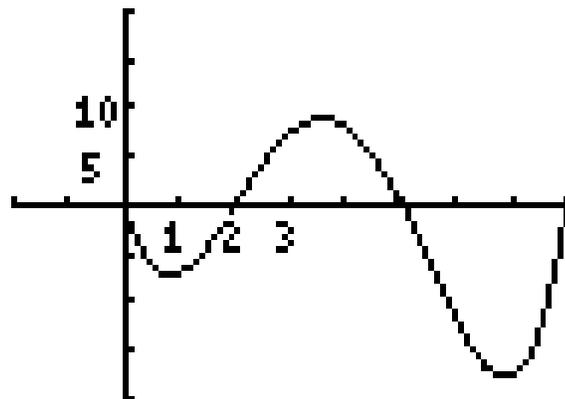
- a) Find the area of this region. _____
- b) Rotate the region about the y-axis and find its volume. _____
- c) Rotate the region about the x-axis and find its volume. _____
- d) Rotate the region about the line $x = -1$ and find its volume. _____
- e) Find the arc-length of $y = \sqrt{x}$ from $x = 0$ to $x = 9$ _____
- f) Find the surface area of the solid generated in part b. _____

5. (10pts) Find the following antiderivatives, show work, and use appropriate notation.

a) $\int x e^{2x} dx$

b) $\int x e^{x^2} dx$

6. (20pts) to the right is a sketch of the famed mouse's velocity in ft/sec in a long tube. A positive velocity represents movement to the right. Assume the mouse started at the center of the tube.



- a) At what time was the mouse the farthest to the right of center?
- b) Approximate how far the mouse was from the center of the tube at the time in part a).
- c) At what time was the mouse traveling the fastest? How fast and in what direction was she traveling?
- d) If the mouse had a little mouse odometer on her foot, how far would it say she traveled on this graphed interval, approximately?
- e) After $t = 0$, approximate the time(s) when the mouse was at the middle of the tube.