

Professor Robert Smith?, University of Ottawa, MAT 1332, Fall 2012
Assignment 2, due Thursday September 27, 5:30pm at the beginning of class.
Late assignments will not be accepted; nor will unstapled assignments.

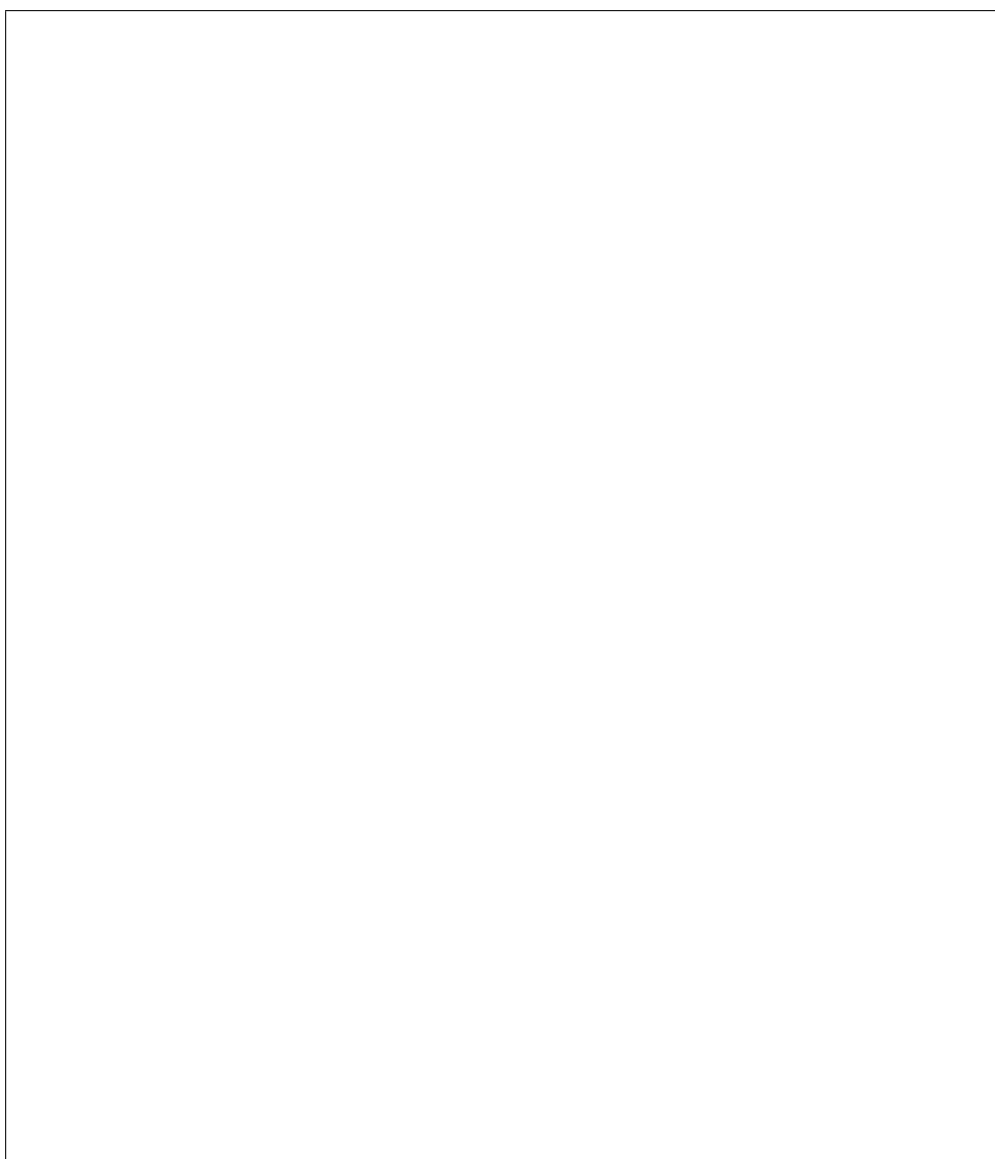
Student Name _____ Student Number _____

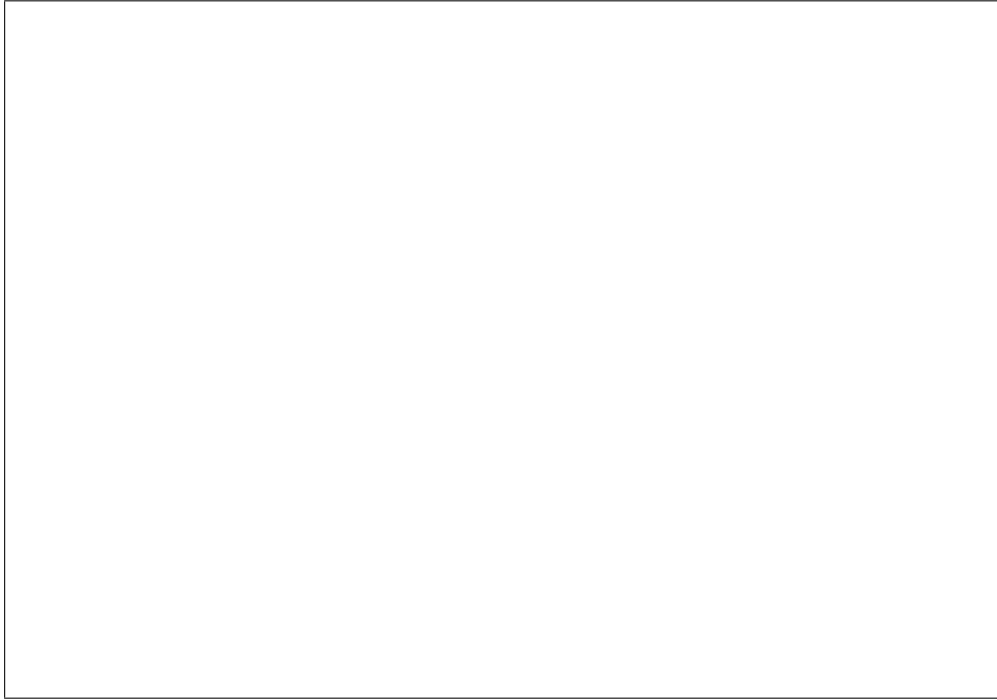
By signing below, you declare that this work was your own and that you have not copied from any other individual or other source.

Signature _____

1. Find the area between $f(x) = \sin(\pi x)$ and $g(x) = \cos(\pi x)$ for $-2 < x < 0$.

(Hint: Sketch the curves.)

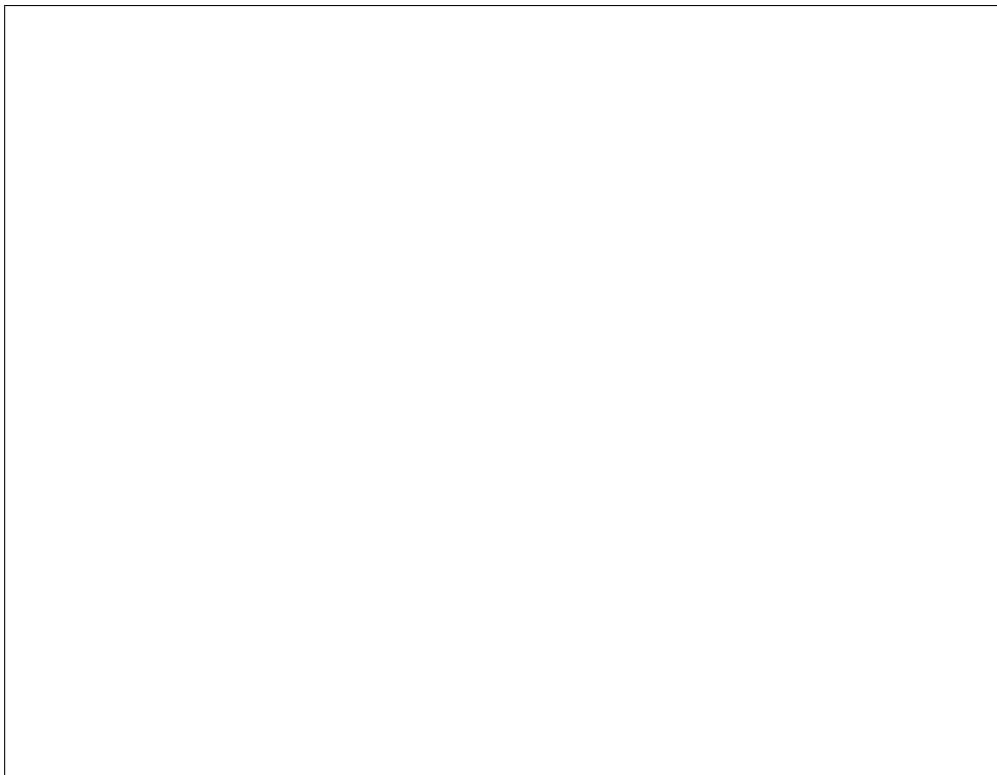


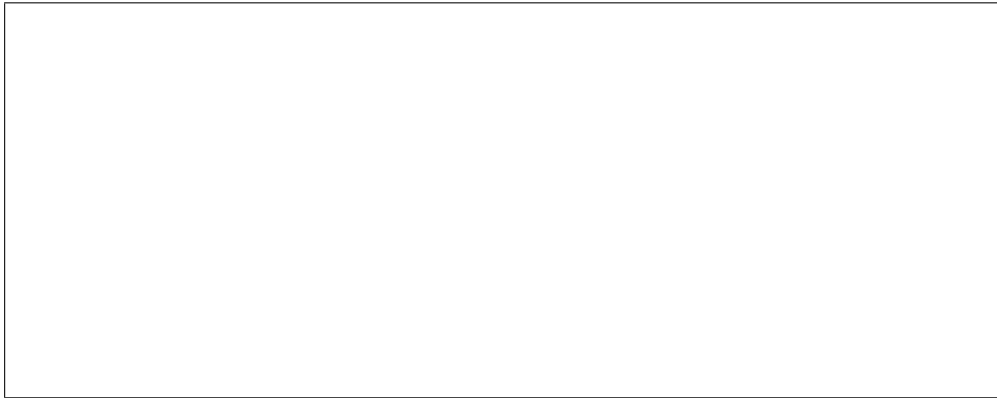


2. Suppose that energy is produced at a rate of

$$E(t) = |300t - 37t^2 + t^3|$$

where E is measured in joules per hour and t is measured in hours. Find the average energy generated between $t = 0$ and $t = 25$. (Hint: The rate is zero at times $t = 0, 12$ and 25 .)





3. Consider a skinny snake that is 3 metres long, with a density described by

$$\rho(x) = 3 \times 10^{-5}x - 11 \times 10^{-8}x^2 + 10^{-3}$$

where ρ is measured in kilograms per centimetre and x is measured in centimetres from the tip of the tail.

- (a) Find the minimum density of the snake.
- (b) Find the maximum density of the snake.
- (c) Where does the maximum occur?
- (d) Where does the minimum occur?
- (e) Find the total mass of the snake.
- (f) Find the average density of the snake.
- (g) How does the average density compare with the minimum and maximum?
- (h) Graph the density and average.

(a)

(b)

(c)

(d)

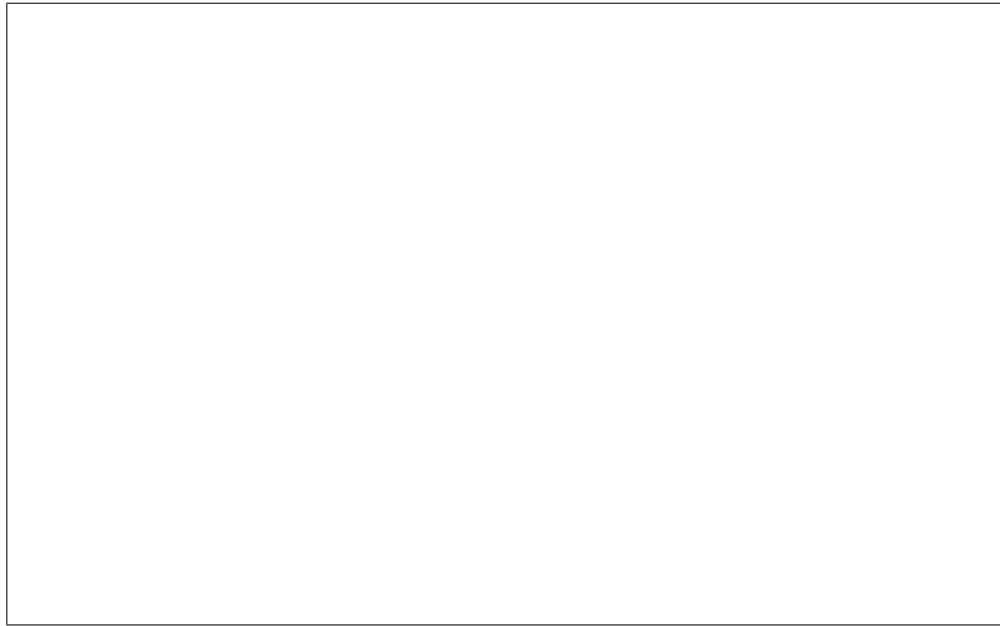
(e)

(f)

(g)



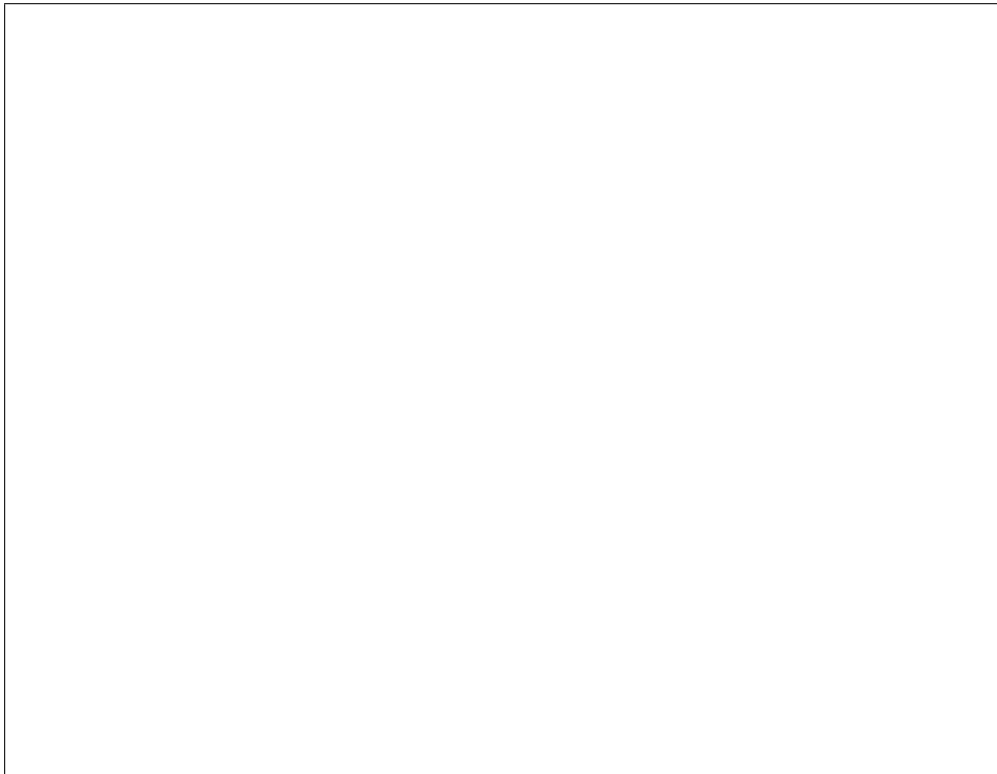
(h)



4. A less-skinny 3-metre-long snake's body is given by rotating the function

$$y = \frac{1}{7}e^{-0.003x}$$

around the x -axis (the units of x and y are in centimetres). What is the volume of this snake?



5. Find the volume obtained by rotating $f(x) = \tan\left(\frac{x}{4}\right)$ around the x -axis between $-\pi$ and π . (Hint: Find the derivative of $g(\theta) = \tan(a\theta)$, where a is a constant.)