

Your Name

Your Signature

Student ID #

--	--	--	--	--	--	--

Quiz Section

--	--

Professor's Name

TA's Name

Problem	Total Points	Score
1	10	
2	10	
3	10	
4	10	
5	10	
Total	50	

- Phones off, no earplugs.
- This exam is closed book. You may use one  $8\frac{1}{2} \times 11$  sheet of handwritten notes (writing on both sides).
- Do not share notes.
- You may use a scientific calculator, but only the Ti-30x IIS Calculator. No other calculator is allowed.
- In order to receive credit, you must show your work. Do not do computations in your head. Instead, write them out on the exam paper. You will not receive credit if you use a trial and error (or guess and check) method when an algebraic method is available.
- Place a box around **YOUR FINAL ANSWER** to each question.
- If you need more room, use the backs of the pages and indicate to the reader that you have done so.
- Raise your hand if you have a question.

**1. (10 points total)**

This problem involves a car that moves in a straight line on a racing track. Let  $t$  denote the time (measured in seconds) after the start of a race. Suppose that the acceleration (measured in  $\text{m}/\text{sec}^2$ ) of the car at time  $t$  is given by the formula

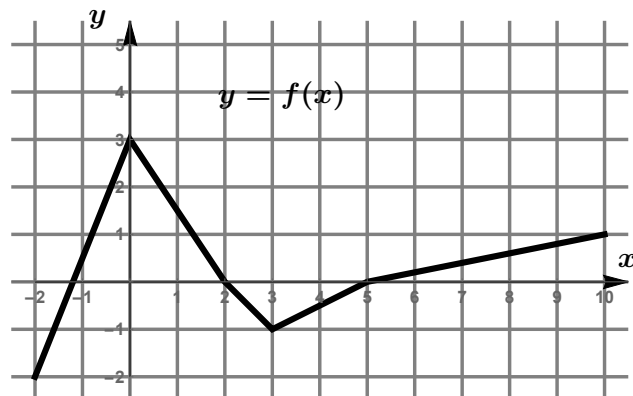
$$a(t) = 10e^{-t/2}.$$

**(a) (5 points)** Find a formula for  $v(t)$ , the velocity of the car (in  $\text{m}/\text{sec}$ ) at time  $t$ , if  $v(0) = 5 \text{ m}/\text{sec}$ .

**(b) (5 points)** Assume as in part (a) that  $v(0) = 5 \text{ m}/\text{sec}$ , and let  $s(t)$  be the position of the car (measured in meters)  $t$  seconds after the start of the race. Assume that  $s(0) = 0$  meter. Where is the car after one minute? (Give a decimal answer, rounding to the nearest meter.)

2. (10 points total) The graph of the function  $f$  is shown below. Let  $g$  be the function defined by the formula  $g(x) = \int_0^x f(t) dt$ .

(a) (3 points) What is the value of  $g(5)$ ?



(b) (3 points) What is the value of  $g'(5)$ ?

(c) (4 points) What is the value of  $g''(1)$ ?

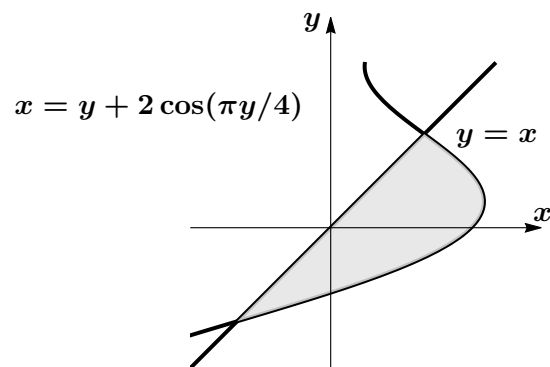
**3. (10 points)**

(a) (4 points) Evaluate the indefinite integral  $\int (e^{3x} + 1)^5 e^{3x} dx$ .

(b) (6 points) Evaluate the definite integral  $\int_2^3 \frac{(x-2)}{(x-2)^4 + 1} dx$ . Give an exact answer.

**4. (10 points)**

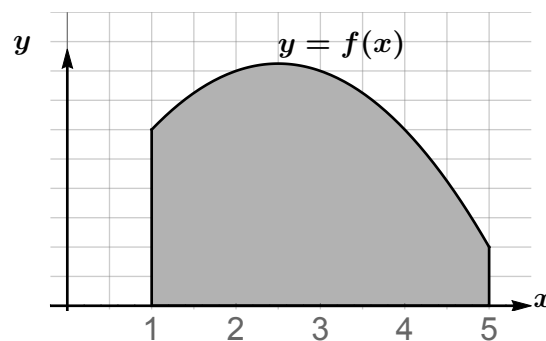
Find the area of the shaded region bounded by the curves  $y = x$  and  $x = y + 2 \cos(\pi y/4)$ , as shown in the figure below.



**5. (10 points)**

The region pictured below is revolved about the  $y$ -axis to form a solid.

(a) (4 points) Express the volume of the solid as a definite integral. (Your answer will involve the function  $f(x)$ .)



(b) (6 points) Using the table of values of  $f(x)$  below, approximate the volume of the solid by approximating the integral in part (a) using a midpoint sum ( $M_n$ ) with  $n = 4$ .

$x$ :	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
$f(x)$ :	24.0	29.0	32.0	33.0	32.0	29.0	24.0	17.0	18.0