

**Math 112**  
**Final Exam**  
**March 21, 2007**

Name: \_\_\_\_\_

1. Your exam contains 6 questions and 6 pages; Please make sure you have a complete exam.
2. The entire exam is worth 100 points. Point values for problems vary and these are clearly indicated. You have 2 hours for this exam.
3. Make sure to **ALWAYS SHOW YOUR WORK**; you will not receive any partial credit unless all work is clearly shown. If in doubt, ask for clarification.
4. If you need extra space, attach extra sheets to the back of the exam and clearly indicate this.
5. You are allowed one  $8.5 \times 11$  sheet of handwritten notes (both sides). Graphing and scientific calculators are allowed.
6. Leave answers in exact form (as simplified as possible) or round to 4 decimal places.

Problem	Total Points	Score
1	20	
2	15	
3	25	
4	15	
5	10	
6	15	
Total	100	

1. (20 pts.) Suppose the production of avocados (in thousands of tons) during a given year in California is given by the function  $A = f(T, R)$ , where  $T$  is the average daily temperature in degrees Fahrenheit and  $R$  is the yearly rainfall in inches. The table below gives values of the function for particular values of  $T$  and  $R$ .

Average Daily Temperature  $T$

	60	65	70
40	10.1	13.3	15.2
50	12.5	18.8	19.5
60	16.8	20.4	21

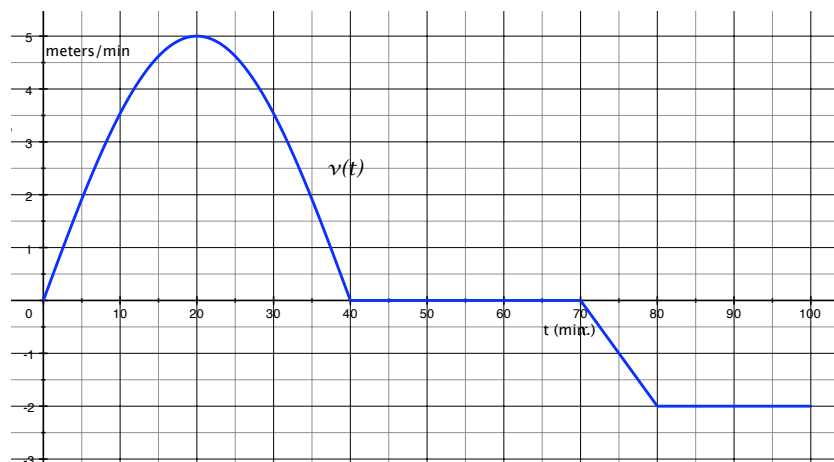
- (a) (5 pts.) Find  $f(65, 50)$  and interpret it in terms of avocado production.

- (b) (8 pts.) Estimate  $f_T(65, 50)$  and  $f_R(65, 50)$  and interpret both in terms of avocado production.

(c) (7 pts.) Estimate  $f(67, 53)$  using the information from parts (a) and (b).

2. (15 pts.) Find the average value of  $f(x) = 3x^2(x^3 - 5)^3$  from  $x = -1$  to  $x = 2$ .

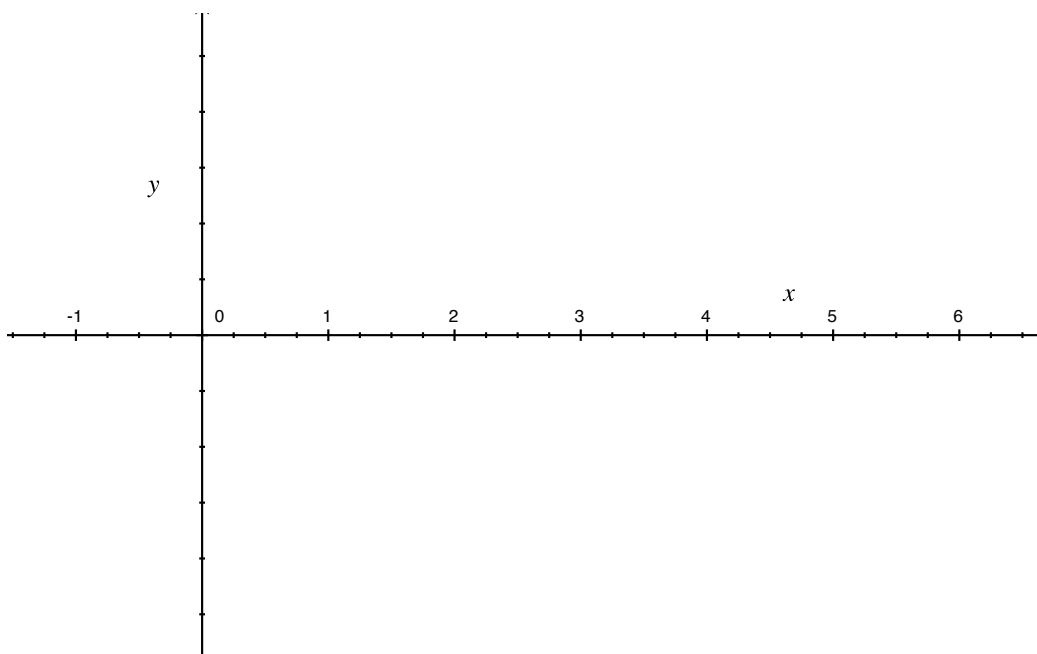
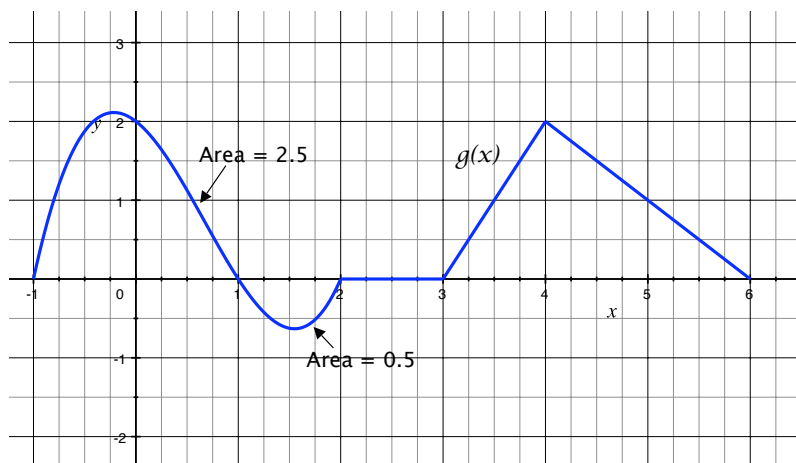
3. (25 pts.) The following graph of  $v(t)$  gives the velocity of a happy traveling llama in meters/minute. Positive velocity indicates time at which the llama travels towards a stream.



- (a) (5 pts.) Estimate time intervals for which the acceleration of llama is positive.
- (b) (7 pts.) Write a definite integral that gives the total change of the llama's position between 0 and 100 minutes.
- (c) (8 pts.) Approximate the integral from part (b).

- (d) (5 pts.) If the llama arrived at the stream at  $t = 40$ , then what was the distance between the llama and the stream at time 0?

4. (15 pts.) Given the graph of  $g(x)$  below, sketch a graph of  $G(x)$  such that  $G'(x) = g(x)$  and  $G(2) = 1$  for  $-1 \leq x \leq 6$ . Include the function values of  $G$  at  $x = -1, 1, 2, 3,$  and  $6$ .



5. (10 pts.) Find the consumer surplus for the demand curve  $p = 400 - e^{.02q}$  when 200 units are sold.

6. (15 pts.) For the function  $z = f(x, y) = 2x^2e^y + \ln y + 5x$ , find  $\frac{\partial z}{\partial x}\Big|_{(3,1)}$  and  $\frac{\partial z}{\partial y}\Big|_{(3,1)}$ .