Math 112
Final Exam
March 22, 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 8.5×11 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	15	
6	10	
Total	100	

1. (20 pts.) Suppose the annual harvest of apples (in millions of boxes) in Washington 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

	45	50	55
4	72.1	76.3	80.4
8	82.6	91.5	97
12	87.3	102.7	112.6

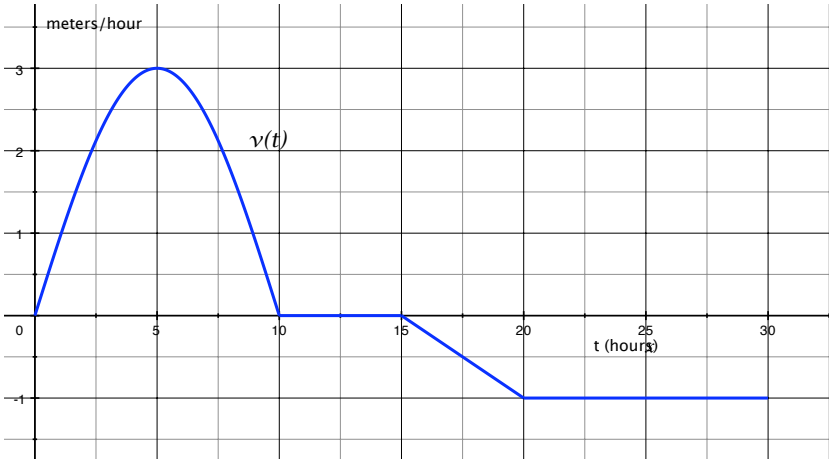
(a) (5 pts.) Find $f(50, 8)$ and interpret it in terms of the apple harvest.

(b) (8 pts.) Estimate $f_T(50, 8)$ and $f_R(50, 8)$ and interpret both in terms of the apple harvest.

(c) (7 pts.) Estimate $f(53, 9)$ using the information from parts (a) and (b).

2. (15 pts.) Find the average value of $g(t) = 4t^3(t^4 - 3)^4$ from $t = -1$ to $t = 2$.

3. (25 pts.) The following graph of $v(t)$ gives the velocity of a sloth in meters/hour. Positive velocity indicates time at which the sloth travels towards a water hole.



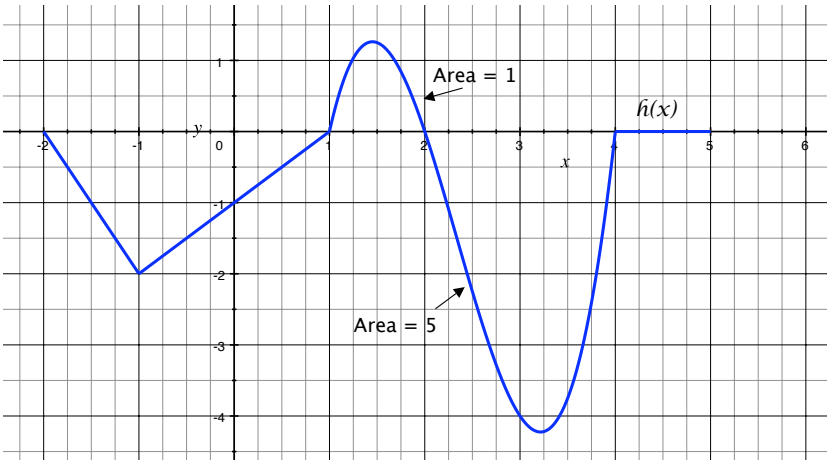
(a) (5 pts.) Estimate time intervals for which the acceleration of sloth is positive.

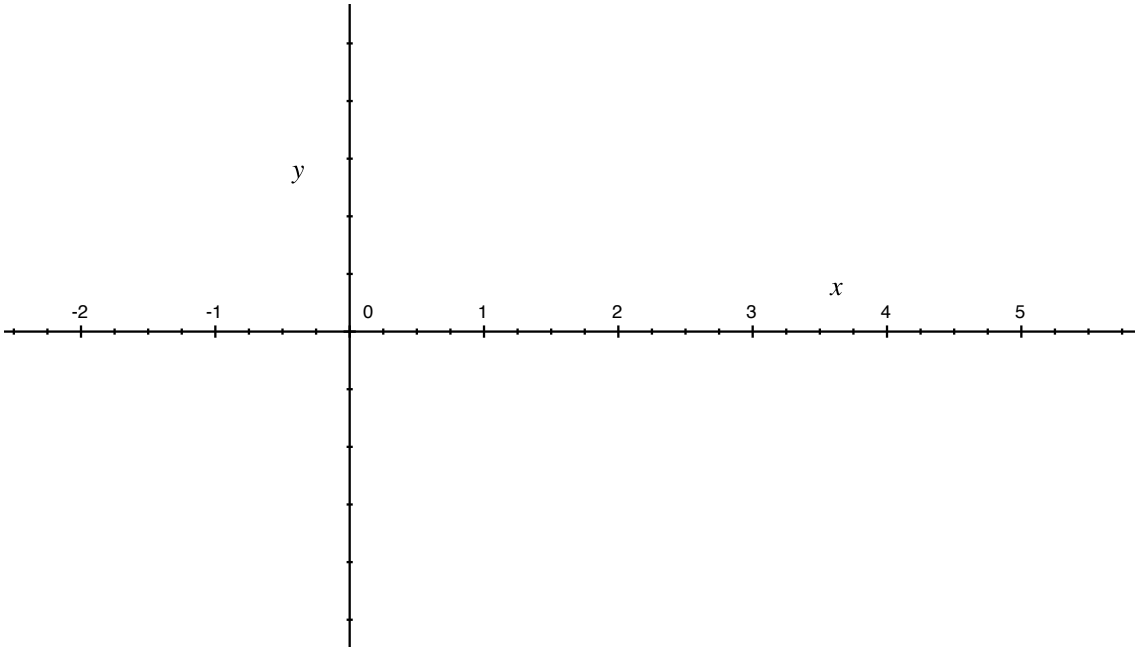
(b) (7 pts.) Write a definite integral that gives the total change of the sloth's position between 0 and 30 hours.

(c) (8 pts.) Approximate the integral from part (b).

(d) (5 pts.) If the sloth arrived at the water hole at $t = 10$, then what was the distance between the sloth and the water hole at time 0?

4. (15 pts.) Given the graph of $h(x)$ below, sketch a graph of $H(x)$ such that $H(1) = 1$ and $H'(x) = h(x)$ for $-2 \leq x \leq 5$. Include the function values of H at $x = -2,\ 1,\ 2,\ 4$, and 5.





5. (15 pts.) For the function $z = f(x, y) = 4x^2 + 3x^3 \ln y + e^y$, find $\left.\frac{\partial z}{\partial x}\right|_{(2,3)}$ and $\left.\frac{\partial z}{\partial y}\right|_{(2,3)}$.

6. (10 pts.) Find the consumer surplus for the demand curve $p = 250 - e^{.01q}$ when 300 units are sold.