

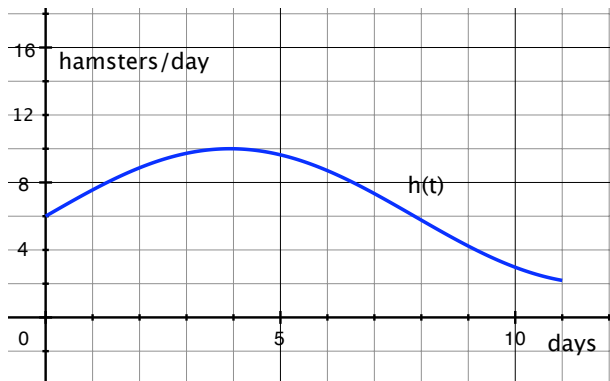
Math 112
Exam 2
March 2, 2007

Name: _____

1. Your exam contains 5 questions and 5 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 50 minutes 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, use the back page 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	15	
2	25	
3	15	
4	25	
5	20	
Total	100	

1. (15 pts.) At a local pet shop, the rate of change of sales of hamsters (in hamsters/day) on day t is given by the function $h(t)$. Approximate the number of hamsters sold between day 0 and day 6.



2. (25 pts.)

(a) (8 pts.) $\frac{d}{ds} \left(\frac{5s}{1+3s^2} \right)$

(b) (8 pts.) $\int 3x^5 + 9e^{3x} + 1 dx$

(c) (9 pts.) $\int \frac{6t^2}{(t^3+2)^3} dt$

3. (15 pts.) Suppose the population of the United States in millions of people is modeled by the logistic function $P = \frac{548}{1+25e^{-.06t}}$ where t is in years since 1950.

(a) (5 pts.) What does this model predict for the maximum sustainable population in the US?

(b) (10 pts.) According to this model, during which year is the population growing the fastest?

4. (25 pts.) $g(t) = (t - 3)e^{-t} + 5$

(a) (15 pts.) Find the critical points of $g(t)$. Identify each critical point as a local maximum, local minimum, or neither using either the first or second derivative test.

(b) (10 pts.) If the domain is restricted to $0 \leq t \leq 6$, what are the global maximum and global minimum values of g on this domain?

5. (20 pts.) Suppose you sell trinkets for \$24 each. The following tables give the marginal cost and average cost for producing certain quantities of trinkets.

quantity	300	400	500	600	700	800	900	1000	1100	1200
MC	30	24	20	19	18	21	27	35	40	45

- (a) (5 pts.) To increase profit, should you increase or decrease production at the production level of $q = 600$?

- (b) (5 pts.) Estimate the production level that maximizes profit.

quantity	300	400	500	600	700	800	900	1000	1100	1200
AC	26	25	24	23	21	20	22	23	25	27

- (c) (5 pts.) If you sell 600 trinkets, is your profit positive or negative, i.e. are you making or losing money?

- (d) (5 pts.) Estimate the maximum profit.