

EXAM 3
Math 106
August 31, 2006

Name _____

You must show all your work. Partial credit will be given.

1. Twenty-five hundred dollars invested in an account that pays 6.4% interest, compounded quarterly, will generate an amount $A = 2500(1.016^{4t})$ dollars in t years.

(a) How much is in the account after three years and what is the rate of change of the amount in the account at three years? (10 pts)

(b) Using part *a* estimate the amount you would expect to be in the account after three and one half years. (Do not use the equation to find an exact amount, use your previous answers to arrive at an estimate.) (5 pts)

2. For each of the following functions find all relative maximums and/or minimums that exist.
(9 pts each)

(a) $f(t) = 3 + 5t^3 - 60t$

(b) $h(x) = e^{x^2}$

3. Find the absolute maximum, absolute minimum and any inflection point that exists for the function $4x^3 - 24x^2 - 54x + 30$ on the interval from $x = -3$ to $x = 8$. (10 pts)

4. Accelerations (rate of change in speed) for a vehicle during a road test are approximated in the following table.

Time (seconds)	Accelerations (feet per second squared)
0	22.6
2	18.2
4	14.5
6	11.4
8	8.9
10	7.1
12	5.9

- (a) Find a quadratic model for this data. (5 pts)

- (b) Use 5 left-side rectangles to estimate the area of the region between the graph of your model and the input axis from 0 to 12 seconds. (12 pts)

5. The rate of change of annual U.S. factory sales (in billions of dollars per year) for consumer electronic goods to dealers from 1990 to 2001 can be modeled by the equation $s(x) = 0.12x^2 - 0.99x + 5.7$ billion dollars per year where x is the number of years since 1990. Use the idea of a limit of sums to estimate the change in factory sales from 1990 to 2000. Write the definite integral symbol for the exact value of the change in factory sales from 1990 to 2000. (Do not integrate.) (10 pts)

6. Find each of the following: (6 pts each)

(a) $\int 2x^3 - 5x + 3 \, dx$

(b) $\int 7x - \frac{1}{x} \, dx$

$$(c) \int 3\frac{1}{t^2} + 2e^t dt$$

$$(d) \int 3^x - x^3 dx$$

$$(e) \int_1^3 3x^2 - 4x + 3 dx$$