

MA 121 ASSIGNMENT 2

Please show all of your work in answering the following:

- Let $f(x) = x^3 + 6x^2 + 9x$
 - Find the intervals on which f is increasing or decreasing.
 - Identify all relative extrema
 - Find the intervals on which f is concave up or concave down
 - Sketch the curve
- Find the absolute maximum and the absolute minimum of $f(x) = x^2 - 6x + 9$ on the interval $[1, 6]$.
- Sketch the graph of $f(x) = \frac{x^2 + 1}{x}$, identifying relative extrema, inflection points, asymptotes, etc.
- Find y' when
 - $y = 3 - x^3 e^x$
 - $y = 4e^{-3x^2 + 5x}$
 - $y = (e^{3x} + 2)^4$
 - $y = 3 \ln 5x$
 - $y = \ln\left(\frac{x+2}{x^2+1}\right)$
 - $y = 7^{2x}$
 - $y = x^5 5^x$
 - $y = \frac{\ln(x^4 - 3x^2)}{(x-5)^3}$
- The half life of cobalt-60 is 5.3 years.
 - Find its decay rate.
 - If you initially have 15 grams of this material, how long until only 10 grams remain?
- An open box is to be constructed from a piece of cardboard that is 30 in. by 30 in. by cutting a square out of each corner and folding up the sides. What are the dimensions of the box that will yield the maximum volume?

(OVER)

7. An airport shuttle has an average of 1200 passengers per day and charges \$15 per ride. Each 1 dollar increase in fare results in a loss of 50 riders. What should the fare be to maximize the revenue?
8. Suppose that a population that is exhibiting exponential growth triples after 8 years. What will the population be after 16 years if the original population was 10000?
9. Find the present value of \$15000 due 5 years later at 6.1% compounded continuously.