Exam 2
Chapters 3 and 4

Answer the following questions. *You must show your work to receive full credit.* Be sure to make reasonable simplifications. Indicate your final answer with a $\boxed{\text{box}}$.

1. (5 points) Consider the graph of the function f given below. Determine the signs of its first and second derivative.

2. (5 points) Find the derivative of the function $g(t) = e^t + 4t^5$.

3. (5 points) Find the derivative of $P = t^2 \ln t$.

4. (5 points) Find the derivative of the function $f(x) = \frac{x^2}{1+e^{5x}}$.

5. (5 points) Find the derivative of $w = \ln(t^2)$.

6. (5 points) Find the derivative of the function $g(x) = te^{t^2}$.

7. (10 points) Find all critical points and inflection points for the function $f(x) = 3x^5 - 5x^3$. For each of the critical points determine if it corresponds to a local maxima, local minima or neither. (No work=No credit)

8. (10 points) Find the global maxima and minima for the function $g(x) = 2x^3 - 9x^2 + 12x + 1$ on the interval $0 \leq x \leq 3$.

9. (10 points) You have 1600 ft of fencing and you are trying to fence in a rectangular horse corral. However, your neighbor already has a fence along one side of your property which you will not need to fence off. What is the maximum area that you can enclose in your horse corral?

10. (10 points) The demand equation for a quantity q of a product at price p, in dollars, is $p = -5q + 5000$. Companies producing the product report the cost, C, in dollars, to produce a quantity q is $C = 10q + 5$. For what quantity q will profit be maximized? What is the maximum profit? (<u>Hint:</u> Revenue=$R = pq$.)

Bonus Question. What makes a good friend?