HOMEWORK 1 - MATH 151
DUE DATE: Monday, January 28
INSTRUCTOR: George Voutsadakis

Read each problem **very carefully** before starting to solve it. Two out of the eight problems will be chosen at random and graded. Each problem graded will offer you 5 bonus (extra) points towards your class average. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. Find the vertex, the axis of symmetry, the opening direction and the intercepts and, then, roughly (but clearly) sketch the graph of the function $f(x) = 3x^2 + 18x$ indicating all points collected.

2. Find the vertex, the axis of symmetry, the opening direction and the intercepts and, then, roughly (but clearly) sketch the graph of the function $f(x) = -x^2 - x + 6$ indicating all points collected.

3. The price p and the quantity x sold of a certain product obey the demand equation $x = -20p + 500, 0 \leq p \leq 25$.

   (a) Express the revenue R as s function of x.
   (b) What is the revenue if 20 units are sold?
   (c) What quantity x maximizes the revenue?
   (d) What is the maximum revenue?
   (e) What price should be charged to maximize the revenue?

4. A farmer with 2000 meters of fencing wants to enclose a rectangular plot that that borders on a straight highway. If the farmer does not fence the side along the highway, what is the largest area that can be enclosed?

5. Find the values of the function $f(x) = x^4$ at the points $x = -2, -1, 0, 1, 2$. Use those points to roughly sketch the graph of the function $f(x) = x^4$. Then use shifts and reflections to sketch the graph of the function $g(x) = -(x + 2)^4 + 16$.

6. Show in a neat way the end behavior of the polynomial functions $f(x) = 4x^5 - 6x^3 - x$ and $g(x) = -3x^6 + 9x - 1$.

7. Find the domain of the rational function $f(x) = \frac{x+6}{x^3-8}$.

8. Find the domain of the rational function $f(x) = \frac{x^2+1}{3x^2+5x-2}$.