MA 1613 Section 51 *Practice Exam 2* November 19, 2019

Follow the instructions for each question and show enough of your work so that I can follow your thought process. If I can't read your work, answer or there is no justification to a solution, you will receive little or no credit!

For problems 1 and 2, copmute $f'(x)$ using the definition of the derivative:

1. $f(x) = x^2 - 2x + 3$

2. $f(x) = 2x^2 + x + 5$

For problems 3 - 6, differentiate the following functions:

3. $f(x) = x^{12} + 4x^4 - 6x^2 + 3x - 5$

4. $f(x) = 2x^7 - 9x^3 + 2x^2 + 7x - 13$

5. $f(x) = \dfrac{x^3}{x^2 + 5} + \sqrt{x^3 + 8}$

6. $f(x) = \sqrt{\dfrac{x^3 + 3x + 2}{x^2 + 2x - 1}}$

For problems 7 and 8, find the equation of the tangent line of the following function at the indicated point:

7. $f(x) = 2x^2 + x - 1$ at the point $x = 0$

8. $f(x) = 7x^3 + 2x^2 - 2$ at the point $x = 1$.

For problems 9 and 10, find the relative extrema and classify them for the following functions:

9. $f(x) = x^3 - x^4$

10. $f(x) = 4x^3 - 9x^2 - 30x + 25$

For problems 11 and 12, graph the following functions. That is, find all relative extrema, determine where the functions are increasing and/or decreasing, and where the functions are concave up and/or down.

11. $f(x) = x^3 - 2x^2 - 4x + 3$

12. $f(x) = x^3 - 3x^2 - 144x - 140$

13. If $F(x) = f(g(x))$, where $f(-2) = 8$, $f'(-2) = 4$, $f'(5) = 3$, $g(5) = -2$ and $g'(5) = 6$, find $F'(5)$.