MAT 2410 Week 9 Written Assignment
50 points Covers Section 3.4 – 3.9

3.4 – Limits at Infinity
3.5 – Summary of Curve Sketching
3.6 – Graphing with Calculus and Calculators
3.7 – Optimization Problems
3.8 – Newton's Method
3.9 - Antiderivatives

1. (10 pts) Sketch a complete graph of $f(x)=4\sin^2(x)-3$ on the interval $[0,2\pi]$.

#s 2 – 4: Sketch a complete graph of the given function, using all your calculus skills. I'm supplementing the instruction with College Algebra videos on similar functions. They get it mostly right, but they can't use calculus like you can. The derivatives in this problem stretch are pretty messy. You may use Wolfram Alpha and Desmos Grapher as an assist, but I still want to see the sign patterns for f, f', and f''.

2. (10 pts) $R(x)=\dfrac{3x^2+6x-24}{4x^2+27x+18}$. See College Algebra Video for #2.

3. (10 pts) $\hat{R}(x)=\dfrac{3x^3-18x^2-72x+192}{4x^3-5x^2-198x-144}$. $\hat{R}$ has the same graph as R, with one exception: $\hat{R}$ has a hole.

   See College Algebra Video for #3.

4. (10 pts) $T(x)=\dfrac{3x^3-18x^2-72x+192}{4x^2+27x+18}$. T has a pair of vertical asymptotes and a slant (oblique)

   asymptote. See Video for #4.

5. (5 pts) The profit function that gives profit as a function of the number x of widgets sold, is

   $$P(x)=-0.01x^3+x^2-3x+300,$$

   in U.S. dollars. How many widgets will maximize the profit? What is the maximum profit?

6. (5 pts) Find the x-intercept, x_2, of the tangent line to a function $f(x)$ at the point $(x_1,f(x_1))$.

7. (5 pts) Sketch a graph of the situation in #6.

8. (5 pts) Let $f(x)=x^3-x-1$. Use Newton's Method and an initial value of $x_1=1$ to estimate a zero of f to 4 decimal places.

9. (5 pts) Given $f(0)=f(1)=2$, find $f(x)$ if $f''(x)=\sqrt[3]{x}-\cos(x)$.