Math 141
Review For Final Exam

- Study exam #1, exam #2, and exam #3 closely. Pay more attention to exam #2 and exam #3. There will be several similar problems on the final exam.
- There will be an equation solving section. Be prepared to solve linear, quadratic, exponential, logarithmic, radical, and rational equations.
- Be completely familiar with ALL "toolkit" functions. These include: \( t(x) = x^2 \), \( t(x) = x^3 \), \( t(x) = \sqrt{x} \), \( t(x) = \sqrt[3]{x} \), \( t(x) = b^x \), \( t(x) = \log_b(x) \), and \( t(x) = |x| \). You should have all domains and ranges memorized, as well as the basic graph. Be able to draw simple transformations of these toolkit functions.
- Chapter 4 material on the final exam will emphasize the graphical aspects of polynomial and rational functions. Be prepared to draw graphs given an equation, and to find a reasonable equation given the graph.

Here are some additional problems that emphasize what we've been doing recently. Be aware that there are often several correct answers. I'll only provide a single possible correct answer in each case.

Find a function with the specified properties.

1) Polynomial function with degree = 6 and whose only roots are \( \times = -2, \times = 1, \) and \( \times = 3 \).

2) Rational function whose only roots are \( \times = 3 \) and \( \times = 1 \). Vertical asymptotes at \( \times = -1 \) and \( \times = 2 \). Horizontal asymptote is \( y = 9/4 \).

3) Sketch the graph of \( f(x) = \frac{x^2 - 5x - 6}{x^2 + 3x - 4} \). Label all roots and all asymptotes.

4) Given the graph, find a reasonable equation:
Equation Solving Practice

Solve each of the following equations for \( x \). Give both an exact answer and an answer rounded to the nearest thousandth.

5) \( 3(x - 2) = 4 - 6(x + 3) \)

6) \( \log_3(x^2 - 3x) = 2 \)

7) \( 2e^{x+3} - 12 = 257 \)

8) \( \frac{1}{2e^x} - 6 = \frac{3}{4} \)

9) \( 5 - 4\sqrt{2 - 3x} = -23 \)

10) \( \frac{x+1}{x-3} + \frac{x^2 - 2x}{x^2 - 2x - 3} = \frac{3}{x+1} \)