Math 141

Review for Test 1

Test 1 covers Sections 2.1-2.4 and parts of Chapter 1 including (but not limited to) sections 1.4, 1.5, 1.6, 1.7, 1.9, and 1.10. You should review **all** your homework, notes, and worksheets from the related sections in the book. You are expected to know the quadratic formula. You are NOT allowed to use any homework, notes, or books on the test

You should be able to:

1. Determine if a relation is a function; be able to explain the Vertical Line Test
2. Use function notation correctly
3. Evaluate functions at values and for expressions
4. Find domain and range of a function (and write using correct set notation or interval notation)
5. Graph a function on your calculator and find an appropriate viewing rectangle
6. Use your graphing calculator to solve equations, find intersection points, and find zeros
7. Find the intersection points of graphs of two functions involving linear or quadratic functions
8. Sketch graphs of and evaluate piecewise-defined functions
9. Sketch a graph by plotting points by hand of a given function
10. Recognize and be able to describe properties "parent" functions (constant, linear, square, cube, square root, cube root and absolute value)
11. Use a graph or an algebraic expression to find function values, domain and range, and intervals of increasing and decreasing
12. Find intervals of increasing and decreasing
13. Graph and write an equation of a line given two points or the slope and a point, including horizontal and vertical lines
14. Compute the average rate of change between two values or variables (and simplify)
15. Graph functions using transformations of functions (vertical & horizontal shifts, compressions and stretches, or reflections)
16. Understand how transformations of functions change a given graph and equation
17. Use words to describe the transformations done to a graph (to get a "child" function)
18. Determine if a function is even or odd, both algebraically and graphically
19. Find the solutions (zeros, x-intercepts) of a quadratic function by factoring method, square root method, completing the square, and by using the quadratic formula
20. Solve application problems involving quadratic functions including "falling-body" problems
21. Use a graph and/or the equation to find function values, domain and range, maximum or minimum values, and intervals of increasing and decreasing for a quadratic function
22. Use a graphing calculator to find the exact local maxima and minima and intervals of increasing and decreasing

Review for Test 2

Test 2 covers Sections 1.6, 1.8, 2.5-2.8. You should be able to do all assigned homework problems without difficulty. You should know basic geometry formulas (area and circumference of circles, Area and perimeter of rectangles and triangles).

You should be able to:

1. Set up and solve application problems involving making an equation with one variable
2. Compute the distance and midpoint between two points
3. Use the equation for a circle to graph the circle, and write the equation of a circle given the graph or the radius and center or two points on the circle
4. Find the solutions (zeros, x-intercepts) of a Quadratic function by factoring method, square root method, completing the square, and by using the quadratic formula

5. Put a Quadratic function in vertex (standard) form by completing the square
6. Find the vertex, maximum, or minimum of a parabola (by completing the square and using $x = -b/(2a)$ methods)
7. Find intercepts and the extreme values of a Quadratic function graphically and/or algebraically and use the information to draw an accurate graph of the parabola
8. Find the local maximum and minimum of any function graphically (using calculator)
9. Write an equation of a quadratic function when given the vertex and one other point
10. Set up and solve applied maximum/minimum problems involving Quadratic functions (to solve by finding the vertex) and other functions (to solve graphically)
11. Perform and evaluate combinations of functions (add, subtract, multiply, or divide) graphically or symbolically and find the domain of the combined function
12. Perform and evaluate composition of functions (using algebra, tables, or graphical information)
13. Find the domain of a composition of functions
14. Determine if a function is one-to-one graphically or show a function is algebraically
15. Be able to verify if a function is one-to-one using the Inverse Function Property (using composition of functions)
16. Find the inverse function (equation, table, or graph) for a one-to-one function
17. Know how to restrict the domain of a function to make it be one-to-one
18. Graph the inverse function for a one-to-one function when given a graph
19. When given a function, break it apart into a composition of 2 or 3 different functions
20. Set up a function that is a composition of functions for application problems

Review for Test 3

Test 3 covers Sections 4.1-4.8. You can use a graphing calculator, but you are not allowed to use any notes, books, or homework. You should review and repeat **all** your homework, notes, worksheets, and the related sections in the book. You should be able to do all assigned homework problems without difficulty. You are expected to know the quadratic formula and the basic algebra and graphing calculator skills. **I will provide you with the formulas for Compound Interest, Continuous Compounding, and Exponential Growth and Decay, Newton's Law of Cooling, and applications of Logarithm including pH, earthquakes, and intensities of sound.** However, you need to know when to use each of the equations and how to use them.

You should be able to:

1. Simplify expressions with exponents
2. Evaluate exponential expressions (ex: $f(x) = 3^x$, find $f(4)$.)
3. Graph exponential functions, both by hand by plotting points and with a calculator, and find domain, range, asymptotes, intercepts, etc.
4. Find equations for exponential functions when given two points or a graph.
5. Solve application problems involving exponential functions and logistic functions
   - Set up and solve exponential application problems of the form $P = P_0 a^t$
   - Set up and solve compound interest application problems of the form $A = P\left(1 + \frac{r}{n}\right)^{nt}$
   - Set up and solve continuous compound interest application problems of the form $A = Pe^{rt}$
6. Change exponential equations to logarithmic equations & change logarithmic equations to exponential equations. (ex: convert $e^x = 4.5$ to a logarithmic equation)
7. Evaluate logarithmic expressions without a calculator (ex: find $\log_2 16$)
8. Find the domain of a logarithmic function (ex: find the domain of $f(x) = \log_3(1-x)$)
9. Graph logarithmic functions and know the features of the graph (domain, intercepts, etc)

10. Solve logarithmic equations, including those that need logarithm properties (ex: Solve $2 = \log_3(1-x)$; and ex: $2 = \log_2(1+x) + \log_2(1+x)$)
11. Work with the properties of logarithms to expand or simplify a log expression (ex: write $\log_3(1-x) + \log_3(1+x)$ as a single logarithm).
12. Evaluate or graph logarithmic functions whose base is not e or 10 (using change-of-base formula and your calculator). (ex: graph $f(x) = \log_3(1-x)$)
13. Solve logarithmic and exponential equations, by hand and by the calculator when necessary
14. Solve "complicated" exponential equations involving solving by factoring or solving by the calculator
15. Solve application problems using exponential equations relating to compound interest, exponential growth and decay, half-life information, and Newton's Law of Cooling
16. Solve application problems involving logarithms (pH, earthquakes, and intensities)

Other notes for studying for the final exam:
You may use a calculator (no sharing of calculators and no cell phone calculators).
The final exam is worth 200 points.
You are NOT allowed to use any homework, notes, or books.
You can have up to 3 hours for the final exam.