Math 127
Exam 3 Review Sheet

Section 2.3 - 2.4: Linear Functions and Slope

• Understand the concept of slope and how to find the slope of a line given two points on the line.
• Memorize the three basic forms of a linear equation in two variables (general, slope/intercept, and point/slope)
• Be able to graph a line given its equation and be able to find its slope and intercepts.
• Be able to find an equation for a line by using a description of its features.
• Understand the relationship between the slopes of pairs of parallel lines and pairs of perpendicular lines.
• Understand the graphs, equations, and slopes of both vertical and horizontal lines.
• Understand linear modeling and be able to solve applications involving linear equations.
• Be able to find the average rate of change of a function over some interval. Also be able to explain what this means in practical terms in application settings.

Section 2.5: Transformations of Functions

• Understand the geometric effect of each of the six types of transformations on the graph of a function [reflections across the x and y axes, vertical shifts, horizontal shifts, stretches, and compressions with respect to both x and y].
• Understand the six basic shifts of functions and be able to graph the shifted version of a function based on the graph of the original function.
• Be able to combine multiple shifts together in order to graph a resulting function based on the original graph (using intermediate graphs as needed).

Section 2.6: Combinations of Functions and Composite Functions

• Understand how to form new functions by finding the sum, difference, product, or quotient of two given functions.
• Be able to evaluate and to find simplified "shortcut" formulas for combinations of functions.
• Understand how to find the domain of a function or a combination of two functions.
• Understand composition of functions and how to compute values for a composite function using both the 2 step process and the "shortcut" formula.
• Be able to decompose a given function into two composite parts.
• Be able to find values for combinations and compositions of functions using a table of values.
• Be able to use combinations and composition of functions to solve applications problems.

Section 2.7: Inverse Functions

• Know the definition of a one-to-one function and understand and be able to apply the horizontal line test.
• Be able to prove whether or not a given function is one-to-one.
• Know the definition of inverse functions and the Inverse functions composition property.
• Be able to use algebra to find the inverse of a function and be able to verify that two functions are inverses by computing composite functions.
• Understand the relationship between the domain, range, and graph of a function and those if its inverse (symmetry across the line $y = x$).

Section 2.8: Distance, Midpoints, and Circles

• Memorize and be able to apply both the distance formula and the formula for finding the midpoint of a line segment.
• Know and be able to apply the Pythagorean Theorem to a right triangle.
• Understand how to graph a circle from its equation (perhaps after completing the square) and how to find an equation for a circle from a description of its features.
• Be able to use completing the square to find the Center and radius of a circle by putting its equation into standard form.

Section 8.1: Systems of Linear Equations

Key Topics:

• Understand the definition of a system of linear equations in two unknowns as well as the three possibilities for the number of solutions to such a system [1, none, or infinitely many].
• Know how to find the solution to a system of linear equations using the substitution method.
• Know how to find the solution to a system of linear equations using the elimination method.
• Be able to verify solutions to a system of equations algebraically and be able to graph the lines involved to verify the number of solutions.
• be able to solve basic application problems using systems of linear equations.

Section 4.1: Exponential Functions

• Know the definition of an exponential function $y = b^x$ including the values that b can have. Also know the basic shape of the graphs of exponential functions and be able to draw the graph of a given exponential function.
• Memorize the compound interest formula and be able to use it and other exponential functions to solve basic application problems.
• Be able to solve exponential equations by using the one-to-one property of exponential functions.
• Understand the number e and the fact the the function $P = e^{rt}$ is used to model situations involving "continuous" growth or decay.
• Be able to draw graphs of functions involving e and to solve equations involving e.

Review Problems:
Chapter 2 pp. 306-308 # 31, 32, 34, 36, 37, 38, 41, 42, 44, 47, 48, 49, 50, 51, 53, 57, 60, 63, 72, 73, 75, 76, 77, 79, 81, 86, 89, 92, 93, 98, 100, 102, 105
Chapter 4 pp. 475-476 # 5, 6, 7, 10, 11, 12
Chapter 8 pp. 815-816 # 1, 2, 3, 5, 6, 10