Math 151 Course Objectives

The approximate number of final exam problems corresponding to each objective is indicated in bold.

1. Determine whether a relation is a function. Given a graphical, tabular, or algebraic representation for a function (possibly a piecewise-defined function), evaluate the function and find its domain and range. (Section 4.1) **(2)**

2. Given an algebraic representation of a function, evaluate the function using variable inputs (such as $x - 1$, $x + h$, etc.), and simplify difference quotients involving the function. (Section 4.1) **(2)**

3. Graph an algebraically defined function by plotting points (including the intercepts) and using calculator technology. [Students should be familiar with the graphs of basic functions: x, x^2, x^3, $|x|$, $1/x$, $mx + b$, $\sqrt{x}$, $\sqrt[3]{x}$.] (Section 4.3) **(2)**

4. Given the graph of $y = f(x)$, sketch the graph of $y = f(x) + c$, $y = f(x + c)$, $y = cf(x)$, or $y = f(cx)$. Also know how the algebraic representation of a function is affected by translations, reflections, compressions, or stretches of its graph. (Section 4.4) **(3)**

5. Solve application problems by using functions to model problem situations. (Section 4.2) **(1)**

6. Use the graph of a function to find extreme values and to find intervals on which the function is increasing/decreasing. Use algebraic techniques to find the maximum or minimum value of a quadratic function. (Section 4.2) **(2)**

7. Given two functions f and g, simplify and evaluate the composition $f \circ g$. (Section 4.5) **(1)**

8. Determine if a function has an inverse function. Given a graphical, tabular, or algebraic representation for a function, find the corresponding representation for the inverse function. (Section 4.6) **(2)**

9. Solve polynomial and rational inequalities algebraically and graphically. (Sections 5.1 & 6.1) **(2)**

10. Use factoring and other algebraic techniques to find the real and non-real zeros of a polynomial. [The algebraic techniques may include long division, synthetic division, the quadratic formula, Descartes' rule of signs, the rational zeros test, etc. The graphing calculator may also be used in conjunction with algebraic techniques.] (Sections 5.1–5.4) **(3)**

11. Recognize that non-real zeros of a polynomial with real coefficients occur in complex conjugate pairs. Find a polynomial with real coefficients given some (or all) of its zeros. (Section 5.2) **(2)**

12. Sketch, in detail, the graph of a polynomial and demonstrate a conceptual understanding of turning points, end behavior, intercepts, and the relationship between the shape of the graph and the number and multiplicity of the polynomial's zeros. (Section 5.4) **(3)**

13. Use algebraic techniques to sketch the graph of a rational function. These techniques include, but are not limited to, finding x- and y-intercepts; finding horizontal, vertical, or slant asymptotes; constructing sign charts; and plotting points. (Section 6.1) **(2)**

14. Sketch and interpret the graphs of logarithmic and exponential functions. (Sections 7.1 & 7.3) **(2)**

15. Use the properties of logarithms to expand and simplify logarithmic expressions and to algebraically solve logarithmic equations. (Sections 7.3 & 7.5) **(2)**

16. Algebraically solve exponential equations. (Section 7.1) **(1)**

17. Solve application problems involving exponential growth or decay. (Sections 7.2 & 7.4) **(1)**

18. Use the graphing calculator to approximate solutions of equations. (Sections 5.3 & 7.5) **(1)**

19. For a given set of data, use the linear regression capabilities of the graphing calculator to find the line of best fit and the corresponding linear correlation coefficient. Use the results for prediction and interpretation. (Section 4.2) **(2)**

20. Solve 2×2 and sparse 3×3 systems of linear equations by using any method except the calculator. (Section 8.1) **(1)**

21. Solve systems of linear equations by using augmented matrices and Gauss-Jordan elimination. Recognize when an augmented matrix is in reduced row-echelon form and interpret the reduced form. [Students may use their calculators to reduce augmented matrices.] (Section 8.2) **(2)**

22. Solve application problems involving systems of linear equations. (Section 8.1) **(1)**