

## MATH 32 MIDTERM 1 REVIEW

This is just a list of the main concepts and skills we've explored so far this semester. Its purpose is to help you organize your studying for the midterm exam. Of course, not everything on the exam will correspond exactly to an item on this list, and not everything on this list will be covered on the exam!

- Rational and irrational numbers
- Solving equations and inequalities
- Integer exponents, including exponents that are negative or zero
- General functions:
  - What is a function? What are its domain and range?
  - Graphing functions, and how geometric changes (shifts/stretch/flips) correspond to algebraic changes
  - The vertical line test (demonstrates that a subset of the plane is the graph of a function)
  - What is a one-to-one function?
  - The horizontal line test (demonstrates that a function has an inverse)
  - Finding a formula for the inverse of a function
  - Understanding the relationship between the graph of a function and the graph of its inverse
  - Composition of functions
  - Even and odd functions and the symmetry properties of their graphs
- Lines:
  - Understanding the slope of a line
  - Representing lines (point-slope form, slope-intercept form)
  - Finding the intersection of two lines
- Quadratics:
  - Completing the square to write a quadratic  $ax^2 + bx + c$  in the form  $a(x + h)^2 + v$
  - Finding the vertex/maximum value/minimum value of a quadratic:  $(-h, v)$  when written in the above form.
  - Using the quadratic formula
- Polynomials:
  - Factoring, and finding zeros of polynomials
  - Polynomial arithmetic (adding and multiplying polynomials)
  - Polynomial long division
  - Determining when polynomials are positive/negative (sign analysis)
  - Behavior of polynomials "near infinity" (leading term analysis)
- Rational functions:
  - Finding zeros of rational functions (zeros of the numerator)
  - Vertical asymptotes (zeros of the denominator)
  - Holes in the graph (zeros of both the numerator and denominator)
  - Determining when rational functions are positive/negative (sign analysis)
  - Behavior of rational functions "near infinity" and horizontal asymptotes