

Topics for Exam 1 Math 19, Spring 2013

General information. Exam 1 will be a timed test of 85 minutes, covering 1.5–1.8, 1.10–1.11, and 2.1–2.6 of the text. Most of the exam will be based on the homework and quizzes from those sections. If you can do all of those problems, and you know and understand all of the ideas behind them, you should be in good shape.

You are allowed to use a calculator (but **not** a calculator that can do algebra, like the TI-89 or TI-92) and notes on **ONE** 3×5 note card (both sides).

As mentioned above, your first priority should be to understand the homework and quizzes and the ideas behind them. Besides the list of things you should know, below, you should also be familiar with everything specially emphasized in the text. If time permits, try to do some of the problems that have answers in the back of the book.

Section 1.5. Linear equations and how to solve them. Quadratic equations; zero-product property. Solving quadratic equations by factoring and the quadratic formula. Completing the square. Solving equations related to quadratic equations.

Section 1.6. 4-step guideline for modeling with equations (solving word problems). Examples: just words, speed problems, work problems, Pythagorean Theorem.

Section 1.7. Solving linear inequalities. Solving nonlinear inequalities by factoring and sign chart. Absolute value: $|x - a|$ is the distance between x and a on the number line.

Section 1.8. Distance and midpoint formulas. Definition of the graph of an equation (my favorite question, version 1). Definition of x -intercepts and y -intercepts; finding x - and y -intercepts. Equation of a circle. Symmetries of graphs: with respect to x -axis, y -axis, origin.

Section 1.10. Slope of a line. **Point-slope formula** for the equation of a line. Slope-intercept form of equation of a line. Parallel and perpendicular lines and their slopes.

Section 1.11. Definitions: is proportional to, is inversely proportional to, is jointly proportional to; varies directly, varies inversely, varies jointly. Solving for constant of proportionality k . Word problems.

Section 2.1. Definition of function. Evaluating $f(2)$, $f(a)$, $f(a + h)$, etc. Domain and range of a function; finding domain of a function given by a formula. Evaluating piecewise defined functions (split formulas).

Section 2.2. Definition of the graph of a function (my favorite question, version 2). Graphing piecewise defined functions (split formulas). Vertical line test. Graphs of familiar functions: linear, power, root, reciprocal, absolute value functions.

Section 2.3. Definitions: increasing on an interval, decreasing on an interval, local maxima and minima. Recognizing increasing, decreasing, local max, local min on a graph.

Section 2.4. Average rate of change: definition, interpretation as slope of secant line, real-life interpretations.

Section 2.5. Idea of transformations of graphs. Vertical shifts; horizontal shifts; vertical and horizontal reflections/flips; vertical stretching and shrinking; horizontal stretching and shrinking. Outside (vertical) is intuitive; inside (horizontal) is perverse. Even and odd functions.

Section 2.6. Sums, differences, products, and quotients of functions and their domains. Compositions of functions and their domains: Basic examples, $f \circ g$ versus $g \circ f$. Computing $(f \circ g)(x)$: formulas, tables, graphs. Finding domains. For calculus: Expressing $H(x)$ as $(f \circ g)(x)$.

Not on exam. (1.5) The discriminant. (1.10) General equation of a line. (2.2) Greatest integer function.