

Topics for the semester exam

Mr. Neeman. 10A, Nov. 18, 2011

1. Algebra

- (a) Multiplying out, factorization, completing the square.
- (b) Quadratic equations (don't worry about free fall).
- (c) Polynomial equations.
- (d) Radical equations.
- (e) Fractional equations.
- (f) Linear inequalities.
- (g) Quadratic inequalities.
- (h) Polynomial inequalities.
- (i) Fractional inequalities.

2. Logic

- (a) Propositions.
- (b) Tautologies, contradictions, contingent propositions.
- (c) Translation between English and logical notation.
- (d) Constructing truth tables.
- (e) Using truth tables to check whether a proposition is a tautology, a contradiction, or contingent, and whether two propositions are logically equivalent to each other or not.
- (f) Converse, inverse, contrapositive.

3. Functions (general concepts)

- (a) Function, domain, codomain, range.
- (b) Finding images and preimages (when given the mapping or the graph).
- (c) Step functions.
- (c) Sketching a function using a table of values.
- (d) Finding the maximal domain of a function (e.g. with square roots, fractions).
- (e) Identifying the range and domain of a function (given the graph).
- (f) Finding a function's intersections with the axes.
- (g) Monotonicity (increasing, decreasing, etc.).
- (h) Concavity.
- (i) Injectivity, surjectivity, bijectivity.
- (j) Substitution (e.g. finding $f(y^2)$ given $f(x)$).
- (k) Composition.
- (l) Inverse functions.
- (m) Horizontal and vertical transformations of functions (describing in words, and sketching graphs).
- (n) Functions on finite sets (the last topic we did).

4. Linear functions and analytic geometry

- (a) Definition of a linear function.
- (b) Intersections with the axes, drawing the graph (incl. cases where the domain isn't \mathbb{R}).
- (c) Applying the concepts from functions (domain, codomain, range, increasing, injectivity, etc.) to linear functions.
- (d) The two forms for the equation of a line (incl. finding the equation given the graph); checking whether a point lies on a given line.
- (e) Finding the equation of a line given two points, or one point and the gradient.
- (f) Horizontal and vertical lines.
- (g) Finding the intersection of two lines (incl. cases where there is no intersection since they're parallel).
- (h) The distance between two points.
- (i) The midpoint between two points.
- (j) Parallel lines, perpendicular lines.
- (k) Exercises combining the above topics.
- (l) Exercises involving triangles or rectangles (you need to know the basic concepts such as base, height, vertex, diagonal, etc. and the formulas for area and perimeter, though for the triangles you will only have to use the formula $\frac{1}{2}bh$, not $\frac{1}{2}ab \sin C$ or Heron's formula).