

MAT 161-004 and MAT 161-300
Main Topics for Test 1
Tuesday, Sep. 20, 2011

Graphs of functions

Be able to:

- graph piecewise defined functions by hand
- sketch graphs of “basic graphs” by hand without plotting points. “basic graphs” are:

$$y = x^2, y = mx + b, y = \sqrt{x}, y = |x|, y = \sin x, y = \cos x, y = e^x, y = \ln x$$

- recognize “shifts” and “flips” of basic graphs from their algebraic form
- recognize the effect of absolute value on the graph of a function
- determine if a function is even, odd or neither (graphically or algebraically)
- find the equation of a line, given two points on the line

Limits

Be able to:

- deduce limits (including one-sided limits) visually from graphs
- use limit laws to calculate limits
(including limits of constant functions, polynomials, rational functions, and the use of the Squeeze Theorem)
- prove the limit of a linear function is a certain number using the ϵ, δ - definition of limit
- recognize whether a function is continuous at a number or on an interval (either from a graph or from a formula)
- apply the Intermediate Value Theorem to a continuous function on a closed interval
- find infinite limits and vertical asymptotes
- find limits at infinity and horizontal asymptotes

Tangents and instantaneous velocities

Be able to:

- use $\lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h}$ to find the slope of the tangent line at a point
- find the equation of the tangent line to $y = f(x)$ at a point
- find the average velocity of an object in a time interval
- use $\lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h}$ to find the instantaneous velocity of an object
- estimate average rate of change and instantaneous rate of change from a graph or from a table of values