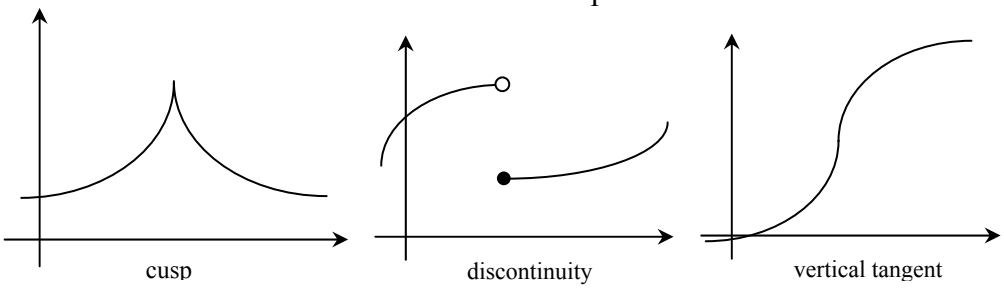
Mth133 – Calculus: Exam 2 Review

Note: This is not a complete list of topics – you should study your lecture notes and homework in addition to reviewing the items listed here.

1. derivatives
    a. what does it mean?
        i. slope of tangent line
        ii. rate of change
        iii. velocity
        iv. etc.
    b. know the definition
    $$f'(x) = \lim_{\Delta x \to 0} \frac{f(x+\Delta x) - f(x)}{\Delta x}$$
    c. differentiation rules
        i. product rule
        ii. quotient rule
        iii. chain rule
    d. trig derivatives (know all 6)
2. when does a function fail to be differentiable at a point?



3. implicit differentiation
    a. add $\frac{dy}{dx}$ (or y') whenever differentiating a function of y
    b. remember to use the product rule for combinations of x and y
    c. when finding $\frac{d^2y}{dx^2}$, substitute $\frac{dy}{dx}$ back in.
4. position, velocity, and acceleration
    a. $s = f(t), \quad v = \frac{ds}{dt}, \quad a = \frac{dv}{dt}$
    b. <u>think</u> about the question
5. graphing $y = f'(x)$ from the graph of $y = f(x)$
6. higher order derivatives
    a. $y'' = f''(x) = \frac{d^2y}{dx^2}, \quad y''' = f'''(x) = \frac{d^3y}{dx^3}, \quad \ldots, \quad y^{(n)} = f^{(n)}(x) = \frac{d^ny}{dx^n}$

7. Related rates
    a. general strategy:
        i. draw a picture and label it
        ii. write down the given information
        iii. write down the unknowns
        iv. write down equation(s) relating the variables
        v. differentiate with respect to t
        vi. evaluate (solve)
    b. remember not to substitute in values (i.e. $h = 5$ ft) until the very last step
    c. main equations are:
        i. $a^2 + b^2 = c^2$
        ii. areas
        iii. volumes
        iv. trig functions