Review for Test 2: Sections 2.1 – 2.5 (Note: Section 2.6 will be on Test 3)

ONLY non-CAS calculators will be allowed on the exam. You may not share a calculator with other students during the exam so be sure to bring your own.

Assigned problems: page 109: 1, 3, 5, 7, 9, 11, 13, 17, 18, 25, 27, 33ab, 35, 37, 43
(No "True/False" questions for this review)

Concepts: Given a function in any form, i.e. as a formula, as a graph, as a table of data or as a description of an application:

- Approximate the value of the derivative at a point, x = a, given
  - a graph (find or estimate the slope of the tangent line at a point)
  - a table of data (know how to find the BEST estimate)

- Find the derivative (i.e. find the exact value) at a point, x = a, or as a formula for any x-value, using the limit definition.

  Note: "find the derivative using the limit definition" is equivalent to "find the derivative algebraically" or "find the derivative using difference quotients" or "find a formula for the derivative."

  All of these require that you use analytic techniques, meaning setting up the limit for f', then evaluating the limit algebraically. You shouldn't use your calculator on any part of this sort of problem…all the computation should be done using algebra.

- Interpret the derivative in practical terms, as a rate of change. Include units as part of the interpretation.

- Sketch the graph of f', given the graph of the original function, *f*.

  Key points: $f'(x) = 0$ at any point where *f* levels out.
  - $f'(x) > 0$ on intervals where *f* is increasing
  - $f'(x) < 0$ on intervals where *f* is decreasing
  - $f'(x)$ will be at a max or min value at a point of inflection of *f*

  In general, know the relationship between the value (sign +, - or 0) of $f'(x)$ and the graph of f

- Sketch the graph of f'', given the graph of the original function, *f*.

  Key points: .
  - $f'(x) > 0$ on intervals where *f* is concave up
  - $f'(x) < 0$ on intervals where *f* is concave down
  - $f''(x) = 0$ when f is linear
  - *f* has a point of inflection when $f''(x) = 0$ AND *f* changes in concavity. Note: In logic, an "AND" statement requires that both conditions be satisfied for the statement to be true!)

  In general, know the relationship between the value (sign +, - or 0) of $f''(x)$ and the graph of f

- Know the relationship between the second derivative, acceleration of a particle and the graph of the particle's distance with respect to time.