Math 12002 Exam II Important Topics

Exam II will be given in class on Tuesday, October 4. It will cover Chapter 2 (except section 2.8). The problems will be similar to the homework problems. You will be expected to explain your answers and use proper notation. There may be short answer or short discussion questions on the concepts covered in Chapter 2.

Concepts, Definitions, and Theorems

You should understand, be able to use, and be able to state the following definitions and theorems:

- Definition of the derivative, average and instantaneous rate of change, their relation to each other and to slopes of secant and tangent lines, and to the slope of a curve,

- velocity as the rate of change of position with respect to time, and acceleration as the rate of change of velocity with respect to time,

- differentiation formulas (product, quotient, chain rules, etc.).

You should know the Pythagorean Theorem, circumference and area of a circle, and area and perimeter of triangles and rectangles. Any other geometry formulas needed will be given. You are expected to know all of the differentiation formulas, as well as formulas defining and relating the trigonometric functions (i.e., Equations 4, 5, 6, and 7 of Appendix A).

Basic Skills

You will be expected to be able to do the following:

- Given a position function, write an algebraic expression for average velocity on an interval and evaluate a limit to compute instantaneous velocity at a given time.

- Compute $f'(x)$ or $f'(a)$ (for a specific value of a) using the limit definition of the derivative
$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$
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- Compute $f'(x)$ for any function f involving powers of x, radicals, trigonometric functions, and any combination of these functions, using differentiation formulas.

- Given an equation relating x and y, find $dy\ dx$ by implicit differentiation.

- Compute higher derivatives ($f''(x)$, $f'''(x)$, etc.).

- Find the equation of the tangent line to a curve at a given point (whether the curve is the graph of a function $y = f(x)$ given explicitly or is the graph of an equation relating x and y).

- Find the velocity and acceleration functions given a position function, and compute velocity and acceleration at a given point.

- Find the rate of change of one quantity relative to another at a given point.

- Solve related rates problems.