IMP 11: Math Review for Test 2

Scalar Parametric Equations for a Curve for \( x = x(t), y = y(t) \)
Eliminate the parameter and sketch in the curve \( xy \)-plane.
Find parametrizations of graphs of functions, lines, and circles.

Problems: page 95 #5,11

Vectors in the Plane
Find sums, differences, scalar multiples, and magnitude graphically and via components.
Find components of a vector given the endpoints, and given the magnitude and direction.

Problems: page 804 #7b,9a,13b,25b

Vector Parametric Equations for \( \mathbf{r}(t) = (x(t), y(t)) = x(t)\mathbf{i} + y(t)\mathbf{j} \)
Sketch a graph of the curve, including \( \mathbf{r}(t_0) \) and \( \mathbf{r}'(t_0) \) for a given \( t = t_0 \)
Compute velocity \( \mathbf{v}(t) \), acceleration \( \mathbf{a}(t) \), and speed \( \frac{ds}{dt} \) of a moving particle
Compute vector and scalar displacement, and distance traveled (arc length), for \( t_0 \leq t \leq t_1 \)

Problems: page 864 #27; page 874 #15; page 908 #3, 25; page 420 #9

Applications of the Derivative
Find the intervals on which a function is increasing/decreasing.
Find critical numbers and relative extrema.
Determine concavity and inflection points.
Do curve sketching problems
Do applied max/min and related rates problems.

Problems: page 268#7,17; page 298#11,19; page 224#21,29

Inverse Functions
Show that two function are inverses of eachother.
Determine graphically if a function has an inverse (and find it)

Problems: page 450 #1cd

Exponential, Logarithmic, and Inverse Trig Functions
Find exponentials and logs.
Know the laws of exponents and logs.
Know the definitions of \( \sin^{-1} x \) and \( \tan^{-1} x \), and how to use them.
Know the derivative of exp, log, and inverse trig functions

Problems: page 460#9,15; page 469#7,15,21,25; page 497#3,13a, 27a, 31

Integration
Know integrals involving exp, log, trig, and inverse trig functions (see list)
Know integration by parts

Problems: See Monday HW

Study notes, homework, and quizzes. Good luck on Thursday!