## Math 121 Exam 2 Topics

Exam 2 covers the following topics:

1. Derivative of a function. Be able to calculate $f'(x)$ using the definition $f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$. See for example problems 17–23, Section 2.2. You should also be able to use the technique of rationalization to compute a limit as in Quiz 3.

2. Derivative formulas and applications. Be able to apply the power rule, product rule, quotient rule, and know the derivatives of the trigonometric functions. Be able to find the equation of a tangent line to $y = f(x)$ at the point $(a, f(a))$. Be able to answer questions about the motion of a particle in terms of the first derivative. For practice differentiating, see problems 1–24, Section 2.3 and problems 3–26, Section 2.4. For tangent line practice, see problems 25, 26, 25, 38, Section 2.3 and problems 27–30, Section 2.4. For motion problems, see problems 43–48, Section 2.3.

3. Chain Rule. Be able to compute the derivative of $f(x) = F(G(x))$. One of the skills required is being able to identify $G(x)$ and $F(x)$ – see Problem 2, Exam 1. For practice using the chain rule, see Quiz 4 and problems 7–38, Section 2.5.

4. Implicit differentiation. Given that $x$ and $y$ are related to each other in an equation, be able to compute $\frac{dy}{dx}$ in terms of $x$ and $y$. Having done this, be able to compute the equation of a tangent line to a curve at a given point. See problems 3–22, Section 2.6.

5. Related Rates. Given two or more variables which are functions of time, find how their rates (derivatives with respect to time) are related. Given a verbal description of how the variables are related, be able to express the relation by an equation. See problems 1–20, Section 2.7.