

Calculus 1, Chapter 3 Study Guide

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The following is a *brief* list of topics covered in Chapter 3 of *Thomas' Calculus*. Test questions will be chosen directly from the text. This list is not meant to be comprehensive, but only gives a list of several important topics. I reserve the right to ask you definitions and theorems on the tests. If I do so, then I will choose from the **bold-faced** items below.

3.1 Tangents and the Derivative at a Point. Slope of a Curve,
tangent line, derivative at a point, instantaneous velocity.

3.2 The Derivative as a Function. Definition of Derivative, one sided derivatives, “differentiable implies continuous” (**Theorem 1**).

3.3 Differentiation Rules. Derivative of a constant, Power Rule for Positive Integers, Binomial Theorem, Derivative of the Natural Exponential, Product Rule, Quotient Rule, my square bracket notation, higher order derivatives.

3.4 The Derivative as a Rate of Change. Instantaneous rate of change, velocity, speed, acceleration, jerk.

3.5 Derivatives of Trigonometric Functions. Derivatives of sine, cosine, and the rest.

3.6 The Chain Rule. Chain Rule.

3.7 Implicit Differentiation. Definition of “function f is implicit to an equation $F(x, y) = 0$ ”, implicit differentiation, normal line.

3.8 Derivatives of Inverse Functions and Logarithms. Theorem 3, derivatives of logarithm functions, derivatives of exponentials base

a , logarithmic differentiation, the General Form of the Power Rule, e as a limit.

3.9 Inverse Trigonometric Functions. Definitions of inverse trig functions, identities involving inverse trig functions, derivatives of inverse trig functions.

3.10 Related Rates. The 6 steps involved in a related rates problem.

3.11 Linearization and Differentials. Linearization, differentials, differentials as estimate of change, absolute/relative/percentage change.