Math 1A03/1ZA3: Test #1 Study Sheet

*Note: The existence/absence of any content on this study sheet does NOT guarantee its existence/absence on the test. This sheet is strictly a compact review of the major topics we've covered. You **cannot** use this document as an aid during any tests and/or exams.*

Important Trig Identities:

$$\sin^2(\theta) + \cos^2(\theta) = 1, \qquad 1 + \tan^2(\theta) = \sec^2(\theta), \qquad \sin(2\theta) = 2\sin(\theta)\cos(\theta)$$

Hyperbolic Functions and Identities:

$$\sinh(x) = \frac{e^x - e^{-x}}{2}, \qquad \cosh(x) = \frac{e^x + e^{-x}}{2}, \qquad \tanh(x) = \frac{\sinh(x)}{\cosh(x)} = \frac{e^x - e^{-x}}{e^x + e^{-x}}$$

$$\cosh^2(x) - \sinh^2(x) = 1, \qquad \tanh^2(x) + \operatorname{sech}^2(x) = 1$$

Theorems and Concepts:

You should know and understand the following...

(1) How to find the inverse of a function $f(x)$. If a question is asking you to find the derivative of $f^{-1}(x)$, then the formula
$$\frac{d}{dx} f^{-1}(x) = \frac{1}{f'(f^{-1}(x))}$$
may be of some use.

(2) The definition of continuity. In particular, if you are given a function $f(x)$, understand what it means for f to be continuous at a point x_0.

(3) The definition of derivative. Understand how to use
$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$
by actually using the definition of limit.

(4) Rules of differentiation like the product rule, quotient rule, power rule, chain rule, etc.

(5) How to find equations of tangent lines to a given curve.

(6) The Intermediate Value Theorem (IVT) and how to apply it to functions.

(7) The algebraic and geometric ideas behind Newton's method.

(8) Finding derivatives via "implicit differentiation".

(9) Using logarithmic differentiation to simplify implicit differentiation problems. For this, take note that

$$\frac{d}{dx}\ln(f(x)) = \frac{f'(x)}{f(x)}$$

by the chain rule.

(10) Understand all solutions to your assignment problems.

As a final suggestion, try to be confident going into your midterm (whether you feel ready or not). Writing your test with a positive attitude will help! Study as best you can, that's all anyone can ask.

Good Luck!