Exam #1
Math 202 FG – Daugherty
March 16, 2016

Name (Print): _____

First   Last

Instructions: You are not allowed to use calculators, books, or notes of any kind in aid of completing this exam. Justify/explain all of your answers. Unless otherwise stated, answers without justification **will not receive full credit**. If you need more space, please ask for additional paper.
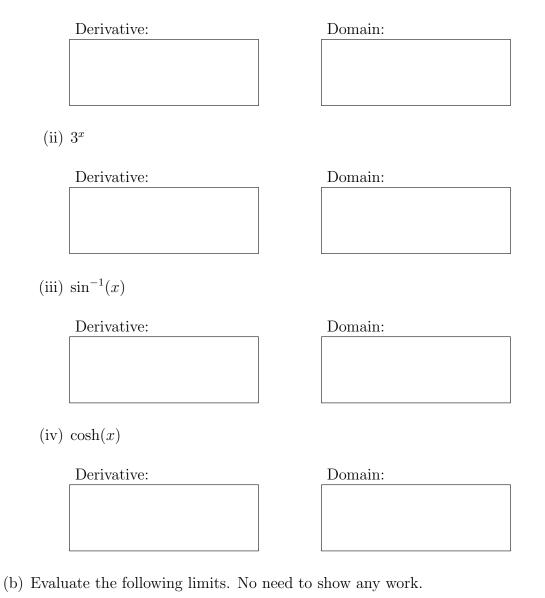
Please sign indicating you have read these instructions.

Signature:_____

Problem #	Out of	Score
1	15	
2	40	
3	15	
4	15	
5	15	
total	100	

1. (15pts) Basic functions.

    (a) For each of the following functions, give its derivative (versus x) and its domain. No need to show any work.

        (i) $\log_3(x)$

Derivative:

Domain:

        (ii) 3^x

Derivative:

Domain:

        (iii) $\sin^{-1}(x)$

Derivative:

Domain:

        (iv) $\cosh(x)$

Derivative:

Domain:

    (b) Evaluate the following limits. No need to show any work.

        (ii) $\lim\limits_{x \to -\infty} \sinh(x)$:

        (i) $\lim\limits_{x \to \infty} \tan^{-1}(x)$:

2. (40 pts) Integration.

    (a) Compute $\displaystyle\int_0^{\pi/2} \sin^2(x)\cos^2(x)\ dx$.   (Definite integral!)

(b) Compute $\displaystyle\int xe^{3x}\, dx$.

(c) Compute $\displaystyle\int \frac{1}{x^2\sqrt{x^2-1}}\,dx$.

(d) Compute $\int \dfrac{5x^2 - x + 2}{x^3 + x}$.

3. (15 pts) Limits.

(a) Compute $\lim\limits_{x\to\infty} e^{-x}\cos(x)$.

(b) Compute $\lim\limits_{x\to 0} \dfrac{1 - \cos(x)}{x^2}$.

(c) Compute $\lim\limits_{x \to \infty} x^{e^{-x}}$.

4. (15 pts) Suppose a population of rabbits grows at a rate proportional to its size. If the population doubles in a month, how long will it take (in months) for the population to grow to ten times its original size? Be sure to show all your work.

5. (15 pts) Show why $\frac{d}{dx} \tan^{-1}(x) = \dfrac{1}{1 + x^2}$.