Name: _____ **Exam 1**

Math 152, Calculus II – Crawford **03 March 2015**

- No calculators, books, or notes (in any form) allowed.
- Clearly indicate your answers.
- ***Show all your work*** – partial credit may be given for written work.
- Evaluate trigonometric, exponential, and logarithmic expressions for standard values.
- Good Luck!

	Score
1	/6
2	/10
3	/8
4	/10
5	/9
6	/14
7	/7
8	/21
9	/14
10	/4
Total	/100

Formulas that you may or may not find helpful

$\cos 2x = \cos^2 x - \sin^2 x = 2\cos^2 x - 1 = 1 - 2\sin^2 x$

$\sin 2x = 2\sin x \cos x$

$\int \sec x \, dx = |\sec x + \tan x| + C$

$\int \csc x \, dx = |\csc x - \cot x| + C$

1. (6 pts). Solve for x.

$\ln(3x^2 - 1) = 5$

2. (10 pts). Given $f(x) = x + \sqrt{x}$, find $\left(f^{-1}\right)'(30)$ [Note: f is one-to-one.]

3. (8 pts). Find the ***exact*** value of the following.

(a). $\sin^{-1}\left(-\frac{1}{2}\right)$

(b). $\sin\left(\sec^{-1}(4)\right)$

4. (10 pts). The amount of Carbon-14 in a plant or animal follows the model of exponential decay $m(t) = m_0 e^{kt}$, $k < 0$. Carbon-14 has a half-life of 5730 years. If a piece of parchment (made from plant material) is found that contains only 75% of Carbon-14 found in currently living plants,

(a). Find the decay rate k. [You do not need to simplify your answers.]

(b). Determine the age of the parchment.

5. (9 pts). Determine the intervals where f is increasing or decreasing.

$f(x) = (2 - x)e^{-3x}$

6. (14 pts). Differentiate the following functions. [***Do <u>not</u> simplify.***]

(a). $y = 5^{\sin x} + 2x \log \sqrt{x}$

(b). $f(x) = \dfrac{\sec^{-1}\left(3x^2\right)}{x^2}$

7. (7 pts). Find y' in terms of x only for

$y = (\cosh 4x)^x$

8. (21 pts). Evaluate the following integrals.

(a). $\displaystyle\int \frac{1}{ax+b}\,dx$ $\qquad a, b$ constants

(b). $\displaystyle\int_1^{e^\pi} \frac{\sin(\ln x))}{x}\,dx$ [***Simplify* your final answer.**]

(c). $\displaystyle\int \frac{2}{1+16x^2}\,dx$

9. (14 pts). Evaluate the following limits. Clearly indicate all steps.

(a). $\lim_{x\to 0} \dfrac{\tan(3x)}{\sin(5x)}$

(b). $\lim_{x\to 0^+} (\cos x)^{1/x^2}$

10. (4 pts). *True or False.* Determine whether the following statements are true or false.

T F $\log_b y = \dfrac{\ln b}{\ln y}$

T F $\tan^{-1}(\tan(x)) = x$ for all x