Name: ______ Math 152, Calculus II – Crawford

Exam 1 03 March 2015

- 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!

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.

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

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

2. (10 pts). Given $f(x) = x + \sqrt{x}$, find $(f^{-1})'(30)$

[Note: f is one-to-one.]

3. (8 pts). Find the <u>exact</u> value of the following.

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

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

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.

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

 $[Do \ \underline{not} \ simplify.]$

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

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

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

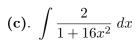
 $y = (\cosh 4x)^x$

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

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

(b).
$$\int_{1}^{e^{\pi}} \frac{\sin(\ln x))}{x} dx$$

[Simplify your final answer.]



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

(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 $\log_b y = \frac{\ln b}{\ln y}$

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