Name: ______________________________ **Exam 1**

Math 152, Calculus II – Crawford **25 February 2020**

- Calculators, books, notes (in any form), cell phones, and any unauthorized resources are ***not*** allowed.
- You may use the given unit circle.
- 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.
- Problems #2, 4(a), and 8(a) will be used to compute extra credit for Quiz 1.
- Good Luck!

Score

1	/8
2	/12
3	/8
4	/16
5	/10
6	/10
7	/14
8	/24
Total	/100

Formulas that you may or may not find helpful

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

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

$$\frac{d}{dx}\left[a^x\right] = a^x \cdot \ln a \qquad \frac{d}{dx}\left[\log_a x\right] = \frac{1}{x \ln a} \qquad \int a^x \, dx = \frac{a^x}{\ln a} + C$$

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1. (8 pts). Solve the following equation for x.

$\ln(2x+1) + \ln x = 0$

2. (12 pts). Given $f(x) = \frac{1}{2}x^3 + x - 1$, find $\left(f^{-1}\right)'(5)$ using the formula $\left(f^{-1}\right)'(a) = \frac{1}{f'(f^{-1}(a))}$.
[Do <u>not</u> attempt to find f^{-1}.]

3. (8 pts). A population grows according to the model $p(t) = p_0 e^{kt}$ where p is the population at time t in years. After 3 years, the populations has grown by 24%. Find the relative growth rate k.
[You do not need a calculator. Leave you answer exact and you do <u>not</u> need to simplify.]

4. (16 pts). Differentiate the following functions. [***Do <u>not</u> simplify.***]

(a). $y = \dfrac{xe^{-x^2}}{5-2x}$

(b). $h(t) = \ln\sqrt{t} - \log_4 3t$

5. (10 pts). Find the equation of the tangent line to $y = 2 \cdot 3^x$ at $x = 2$. [Simplify values.]

6. (10 pts). Use Logarithmic Differentiation to find y' in terms of x only for

$y = x^{\cos x}$

7. (14 pts). Evaluate the following limits.

(a). $\lim_{x \to 0} \dfrac{e^{4x} - 1 - 4x}{x^2}$

(b). $\lim_{x \to 0} (1 - x)^{3/x}$

8. (24 pts). Evaluate the following integrals.

(a). $\displaystyle\int \frac{\pi}{e^{\pi x}}\,dx$

(b). $\displaystyle\int x\sec(x^2)\,dx$

(c). $\displaystyle\int_0^{\pi} \frac{\sin x}{2+\cos x}\,dx$ [Simplify.]