Name: _____ **Exam 2**

Math 152, Calculus II – Crawford **16 October 2018**

- 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	/16
2	/10
3	/38
4	/12
5	/8
6	/8
7	/12
Total	/100

Formulas that you may or may not find helpful

$$\sin^2\theta = \frac{1}{2} - \frac{1}{2}\cos 2\theta \qquad \cos^2\theta = \frac{1}{2} + \frac{1}{2}\cos 2\theta$$

$$\sin 2\theta = 2\sin\theta\cos\theta \qquad \cos 2\theta = \cos^2\theta - \sin^2\theta = 1 - 2\sin^2\theta = 2\cos^2\theta - 1$$

$$\sin A\cos B = \frac{1}{2}[\sin(A+B) + \sin(A-B)] = \frac{1}{2}\sin(A+B) + \frac{1}{2}\sin(A-B)$$

$$\cos A\cos B = \frac{1}{2}[\cos(A+B) + \cos(A-B)] = \frac{1}{2}\cos(A+B) + \frac{1}{2}\cos(A-B)$$

$$\sin A\sin B = \frac{1}{2}[\cos(A-B) - \cos(A+B)] = \frac{1}{2}\cos(A-B) - \frac{1}{2}\cos(A+B)$$

$$\sin(-\theta) = -\sin\theta \qquad \cos(-\theta) = \cos\theta$$

$$\frac{1}{2}\Delta x\,[f(x_0) + 2f(x_1) + 2f(x_2) + 2f(x_3) + \cdots + 2f(x_{n-1}) + f(x_n)]$$

$$\frac{1}{3}\Delta x\,[f(x_0) + 4f(x_1) + 2f(x_2) + 4f(x_3) + \cdots + 2f(x_{n-2}) + 4f(x_{n-1}) + f(x_n)]$$

$$\frac{d}{dx}\left[\sin^{-1}x\right] = \frac{1}{\sqrt{1-x^2}} \qquad \frac{d}{dx}\left[\cos^{-1}x\right] = \frac{-1}{\sqrt{1-x^2}}$$

$$\frac{d}{dx}\left[\tan^{-1}x\right] = \frac{1}{1+x^2} \qquad \frac{d}{dx}\left[\cot^{-1}x\right] = \frac{-1}{1+x^2}$$

$$\frac{d}{dx}\left[\sec^{-1}x\right] = \frac{1}{x\sqrt{x^2-1}} \qquad \frac{d}{dx}\left[\csc^{-1}x\right] = \frac{-1}{x\sqrt{x^2-1}}$$

$$\int \sec\theta\,d\theta = \ln|\sec\theta + \tan\theta| \qquad \int \csc\theta\,d\theta = \ln|\csc\theta - \cot\theta|$$

1. (16 pts). Evaluate the following limits. Clearly indicate all steps.

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

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

2. (10 pts). Use Simpson's Rule with $n = 8$ to **set up** the approximation for the integral $\displaystyle\int_2^4 \frac{1}{\ln x}\, dx$.
[Do not simplify!!]

3. (38 pts). Evaluate the following integrals. [Part (c) is on next page.]

(a). $\int \sin^3 x \cos^5 x \, dx$

(b). $\int (x^3 - 2x) \ln x \, dx$

(c). $\displaystyle\int \frac{\sqrt{x^2-9}}{x}\,dx$

4. (12 pts). Evaluate the following integral or show that it is a divergent improper integral.

$$\int_1^4 \frac{1}{(x-2)^3}\,dx$$

5. (8 pts). Write out the ***form only*** of the partial fraction decomposition for the following function. Do **NOT** determine the values of the coefficients.

$$\frac{3x^2-1}{x(x+2)^3(2x^2+3)}$$

6. (8 pts). List out the first 4 terms in the following sequence.

$a_1 = 2, \;\; a_{n+1} = 2a_n - 1$

7. (12 pts). Determine whether the following **sequences** converge or diverge. **If it converges, find the limit. If it diverges, clearly explain the reason why**. [Clearly indicate $+\infty$ or $-\infty$ in the case of an infinite limit.]

(a). $a_n = 3 + \left(-\frac{2}{3}\right)^n$

(b). $b_n = \sqrt{\frac{1+4n^2}{1+n^2}}$