Name: _____ **Exam 2**

Math 152, Calculus II – Crawford **07 April 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	/8
2	/24
3	/8
4	/24
5	/20
6	/12
7	/4
8	/4
Total	/100

Formulas that you may or may not find helpful

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

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

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

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

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

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

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

1. (8 pts). Write down the ***form only*** of the partial fraction decomposition for the following fraction.
[Do ***NOT*** determine the values of the coefficients.] [Note: $x^2 + x + 1$ does not factor.]

$$\frac{x^3 + 2x^2 - 5}{x(3-x)^3(x^2+x+1)^2}$$

2. (24 pts). Evaluate the following integrals.

(a). $\int e^x \sin(4x)\, dx$

(b). $\int \sqrt{\cos x} \sin^3 x\, dx$

(c). $\displaystyle\int_{1/2}^{e/2} \ln(2x)\, dx$ [Simplify your answer.]

3. (8 pts). Use The Trapezoid Rule with $n = 5$ to approximate the integral $\displaystyle\int_0^1 \sqrt{1+x^3}\, dx$. [Do not simplify!!]

4. (24 pts). Evaluate the following integrals.

(a). $\displaystyle\int \frac{-3x+8}{x(x-2)^2}\,dx$

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

5. (20 pts). Evaluate the following integrals or show that it is a divergent improper integral

(a). $\displaystyle\int_0^2 \frac{1}{1-x}\,dx$

(b). $\displaystyle\int_{-\infty}^0 xe^x\,dx$

6. (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). $a_n = \dfrac{3(-1)^n}{n}$

(b). $b_n = \sqrt{\dfrac{4n-3}{1+9n}}$

7. (4 pts). List out the first 4 terms of the following sequence.

$a_1 = 6, \quad a_{n+1} = \dfrac{a_n}{n}$

8. (4 pts). *True or False.* Determine whether the following statements are true or false.

T F If $f(x) \leq g(x)$ and $\displaystyle\int_0^\infty g(x)\,dx$ diverges, then $\displaystyle\int_0^\infty f(x)\,dx$ also diverges.

T F $\displaystyle\int \sin^2(2x)\,dx = \int \frac{1}{2} - \frac{1}{2}\cos(2x)\,dx$