Name: _____ **Exam 2**

Math 151, Calculus I – Crawford **05 April 2016**

- Calculators, books, notes (in any form), cell phones, and any unauthorized sources are ***not*** allowed.
- Clearly indicate your answers.
- ***Show all your work*** – partial credit may be given for written work.
- ***Good luck***!

	Score
1	/12
2	/20
3	/14
4	/12
5	/10
6	/14
7	/20
Total	/100

1. (12 pts). Find the ***absolute*** maximum and minimum ***values*** of $f(x) = 2x^3 - 3x^2 + 5$ on the interval $[-1, 1]$.

2. (20 pts). Differentiation. [**Do not simplify!**]

(a). Differentiate: $y = \dfrac{1}{\sqrt{2x^6 - 3x + 1}}$

(b). Find the <u>first **AND** second</u> derivatives of $f(\theta) = \sec(5\theta)$.

3. (14 pts). Given the curve $y\cos x = x^2 + 4x + y^3$,

(a). Use implicit differentiation to find $\dfrac{dy}{dx}$.

(b). Find the equation of the tangent line to the curve at $(0, 1)$.

4. (12 pts). Given $f(x) = \dfrac{1}{(1+x)^3} = (1+x)^{-3}$

(a). Find the linearization $L(x)$ at $a = 0$

(b). Use this linearization $L(x)$ to approximate $f(0.2)$. Simplify your answer.

5. (10 pts). Solve the following equation for **all** values of x.

$\sin(x)\cos(3x) + \sin x = 0$

6. (14 pts). A boat is pulled into a dock by a rope attached to the bow of the boat and passing through a pulley on the dock that is 1 m higher than the bow of the boat. If the rope is pulled in at a rate of 2 m/s, how fast is the boat approaching the dock when it is 4 m from the dock?

[Remember that significant partial credit will be given for clearly and accurately labeling the picture, and indicating values and equations in correct mathematical notation.]

[Include units in your answer.]

7. (20 pts). Given the following function and its derivatives,

$$f(x) = \frac{x^2}{x+2} \qquad f'(x) = \frac{x\,(x+4)}{(x+2)^2} \qquad f''(x) = \frac{8}{(x+2)^3}$$

(a). Find the intervals on which f is increasing or decreasing.

(b). Find the local maximum and minimum ***values***.

(c). Find the intervals of concavity.

(d). Find the inflection ***points***.