MATH 220 **Test 2** **July 20 Summer 2015**

Name _____ **NetID** _____

- Circle your TA discussion section.
- Do not open this test booklet until I say *START*.
- Turn off all electronic devices and put away all items except a pen/pencil and an eraser.
- Remove hats and sunglasses.
- You must show sufficient work to justify each answer.
- While the test is in progress, we will not answer questions concerning the test material.
- Quit working and close this test booklet when I say *STOP*.
- Quickly turn in your test to me and show your Student ID.

1	2	3	4	5	6	7	8	9	10	11	$\sum$
8	8	8	8	8	10	10	10	10	10	10	100

1. (8 points) Find $f'(x)$ given that $f(x) = 6\ arcsin\ x + 14\ sec(x) - 5\ \ln(x) + x^{-}3$

2. (8 points) Find $h'(r)$ given that $h(r) = \dfrac{arctan(3r)}{r^2 + 5}$

3. (8 points) Find $w'(v)$ given that $w(v) = \cos(\sqrt{v^4 + 3v^2 + 5})$

4. (8 points) Find $\dfrac{dy}{dx}$ given that $y = (x^3)^{\ln x}$

5. (8 points) Find $\frac{dy}{dx}$ given that $x^3e^x = 10xy$

6. (10 points) The graph of a function $y = f(x)$ has the property that the slope of the curve at every point P is equal to the one fifth of its y-coordinate of P. If the graph of the function has a y-intercept of 5, then find a formula for $f(x)$.

7. (10 points) Determine the absolute minimum y-value on the graph of

$$y = 8e^{4x} - 128x + 240$$

Simplify your answer.

8. (10 points) A function $f(x)$ has the following second derivative.

$$f''(x) = e^{2x}\left(x-6\right)^2\left(x+3\right)^3\left(x^2-169\right)\left(x^2+36\right)$$

Find the intervals of concavity for $f(x)$. State each x-value at which the graph of $f(x)$ has an inflection point.

9. (10 points) Find the points on the parabola $y^2 = 4x$ which is closest to the point (2,8).

10. (10 points) A 10 meter long ladder slides down a vertical wall at a rate of 2 m/s. How fast is the ladder sliding away from the wall at the instant when it is 8 meter away from the wall ?

11. (5 points each) Evaluate the following limits. Simplify your answers.

(a) $\lim_{x \to 0} \dfrac{e^{6x} - 6x - 1}{\cos x - 1}$

(b) $\lim_{x \to \infty} \dfrac{8 \arctan(5x) - 4\pi}{4 \arctan(2x) - 2\pi}$