MATH 220, Exam 1

Name:_____ Date: 06/19/15

You have the entire class time. If you don't understand a question, ask me about it. Good luck!

1. (30 pts) Evaluate the following limits (if it doesn't exist, then explain why):

   (a) $\lim_{x\to 3} \frac{x^2-9}{x^2+2x-3}$.

   (b) $\lim_{x\to 16} \frac{\sqrt{x}-4}{x-16}$.

   (c) $\lim_{x\to \infty} \frac{x+6x^2}{3x^2+\pi}$.

   (d) $\lim_{h\to 0} \frac{(1+h)^2-1}{h}$.

   (e) $\lim_{x\to 5} \frac{x-5}{|x-5|}$.

2. (10 pts) Solve the following equation for t.
   $3^{2t}e = 3e^{2t}$

3. (10 pts) Evaluate $\lim_{x\to 0} xsin(x^{-1})$ using the squeeze theorem.

4. (10 pts)$f(x) = 6x^2$
   (a) What's the average rate of change for $f(x)$ over the interval [1,2]?

   (b) What's the instantaneous rate of change for $f(x)$ at $x = 1$?

5. (10 pts) Prove that $f(x) = 5x^2 + 3x - 7$ has a root between 0 and 1.

6. (10 pts) Find the horizontal asymptote for the following function: $f(x) = \frac{4x^2-6x^4+\pi}{2x^4+15}$.

7. (20 pts) Classify the following functions as continuous or discontinuous. If it's discontinuous, find the discontinuity and state what type it is. If the function is continuous, explain why in terms of "basic" continuous functions.

   (a) $f(x) = (x+\pi)^2$

   (b) $f(x) = \frac{x}{x}$

   (c) $f(x) = \frac{4x+4}{|x+1|}$

   (d) $f(x) = \frac{1}{x^2}$

8. If you miss more than one of the following problems, you get -3 pts from your total score.
   (a) Write $(\sqrt{3})^4$ in exponent form.

   (b) What is $\frac{6}{3} + \frac{1}{2}$?

   (c) Expand out $(a + b)^2$.