EXAM 1: MATH 220 - Calculus 1

June 21st 2017

Name:

Instructor:

1	2	3	4	5	6	7	8	Total

Instructions: You have 1 hour and 15 minutes to complete this exam. Show all of your work. Calculators are not allowed.

1) (4 points each) Calculate the following limits:

a) $\lim_{u\to 4} \frac{\sqrt{u}-2}{4-u} =$

b) $\lim_{x\to 2}(3x^2 + 5x + x^{1/2} - 6) =$

c) $\lim_{\theta\to 0} \frac{cos(\theta)-cos^2(\theta)}{4\theta} =$

d) $\lim_{x\to 1} \frac{2x^2-x-1}{x-1} =$

e)$\lim_{x\to 0} \frac{(x+1)sin(x)}{x} =$

2) (6 points) Find the limits at infinity for the following functions (Make sure to consider both $+\infty$ and $-\infty$, if necessary.)

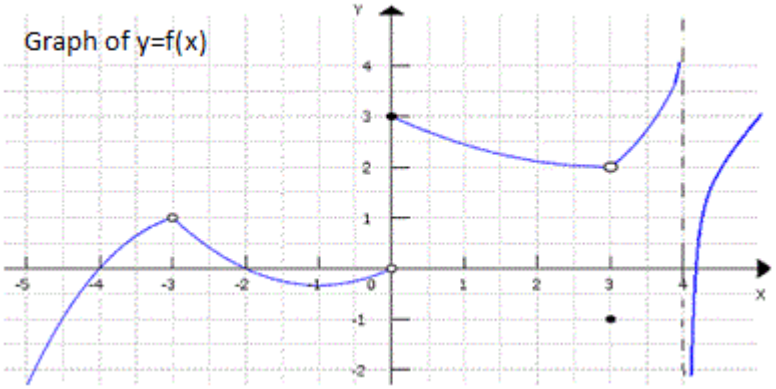
a) $f(x) = \frac{6x^3+x^2-3}{-2x^3-3x^2+x-1}$

b) $g(x) = \frac{4x^3+x+7}{x-2}$

3) (8 points) Show that the equation $2e^t = t^4$ has a solution on the interval $[-1, 0]$. (Hint: Use the Intermediate Value Theorem)

4) (6 points) Find $\lim_{x\to 0}(5x^2\cos(\frac{2}{x}))$ using the Squeeze Theorem.

5) (12 points) Let $f(x) = 2x^2 - x$. Compute f'(-1) using the limit definition, and find an equation to the tangent line at a=-1.



6) (16 points) For each point of discontinuity of the graph of the function y=f(x) above, provide the following information:
a) Type of discontinuity
b) The right and left-hand limits.
c) For any removable discontinuity, how would you redefine f(x) so that it is continuous at those points?
d) For any jump disconuity, is f(x) right- or left-continuous at those points?

7) (4 points each) Calculate the following:

a) Find $\frac{dy}{dx}$ for $y = 7x^4 + 3x^2 - 2x + 1$.

b) $f(z) = \frac{3z^2+1}{e^z+2}$. Find $f'(z)$.

c) $g(x) = (2x^{2/3} - 3x^2)(x^{-1/2} + 5e^x)$

d) $\frac{d}{dx}(\frac{1}{4}x^2 - x^{1/2})$ at x=9

e) Let $y = x^6 - 3x^4 + x^3 - 3x + 2$. Find y".

8) (12 points) Let $s(t) = 50t - \frac{2}{3}t^3$ be a function giving the height of a balloon in feet at time t seconds, $0 \leq t \leq 8.6$.

a) State/write out the equation for how would you find the velocity function v(t) using the limit definition. Then find v(t) using any method.

b) Find the time t which gives v(t)=0. What is the height of the balloon at this time? (Note: you do not need to simplify your answer).