MATH 211 Test 1 Fall '01 NAME:

Show your work to get credits.

1.(10pts) If an arrow is shot upward on the moon with a velocity of $58m/s$, its height in meters after t seconds is given by $h = 58t - 0.83t^2$. Find the average velocity over the time interval $[1, 1.1]$.

2.(30pts) Find the following limits:

a. $\lim_{x\to 3} x^2 - x + 1$

b. $\lim_{t\to 1} \frac{x^2+x-2}{x^2-1}$

c. $\lim_{t\to 0} \frac{\sqrt{1-t}-1}{t}$

d. $\lim_{x\to 4^-} \frac{|x+4|}{x+4}$

e. $\lim_{x\to\infty} \frac{x^2+1}{3x^2+x-1}$

f. $\lim_{x\to-\infty} \sqrt{\frac{2x^2-1}{x+8x^2}}$

3.(10pts) Find $f'(x)$ for $f(x) = \frac{1}{x}$ using the definition.

4.(15pts) Find $f'(2)$ for $f(x) = x^2 + x - 6$ using the definition. Use the result obtained, find an equation of the tangent line to the graph of $f(x)$ at $(2, 0)$.

5.(10pts) Explain why $f(x)$ defined below is discontinuous at -1,

$$f(x) = \begin{cases} \frac{x^2-1}{x+1} & \text{if } x \neq -1 \\ 6 & \text{if } x = -1. \end{cases}$$

6.(15pts) Graph $f(x) = \frac{x^2+1}{x^2-1}$ by specifying the horizontal and vertical asymptotes.

7.(10pts) Sketch the graph of a function for which $f(0) = 0$,$f'(0) = 3$,$f'(1) = 0$ and $f'(2) = 1$.