MATH 211 Test 1 Spring '02 NAME:

Show your work to get credit.

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 $[2, 2.1]$.

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.(20pts) Find the derivatives of the following functions:

a. $f(x) = x^2 - 8x + 6$

b. $f(x) = e^x - \sqrt{x}$

c. $f(x) = \frac{1}{x^2+x+4}$

d. $f(x) = e^x(e^x + x)$

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.(10pts) Given $f(x) = \sqrt{x}$, compute $f'(4)$ using the definition

$$f'(4) = \lim_{h\to 0} \frac{f(4+h) - f(4)}{h}$$

in section 2.8. Also find an equation of the tangent line to the graph of $f$ at $(4, 2)$.