

Math 161 Exam 1, Spring 2006

Show all work!		Name:	Score
1.	The height of a rock thrown upwards in the moon is given by $h = 1.66t - 0.83t^2$. Find the average velocity: a) In the interval $[1, 2]$. Ans: _____	b) In the interval $[1, 1.01]$. Ans: _____	1
			2
			3
			4
			5
			6
			7
			8
2.	Guess the limit. Show a table or a graph as appropriate. a) $\lim_{x \rightarrow 0} (\sin x - x)/x^3$. (Numerically) Ans: _____	b) $\lim_{x \rightarrow 0} (5x/\sin 3x)$. (Graphically) Ans: _____	9
			10
			Tot
3.	Determine the infinite limit by any method: a) $\lim_{x \rightarrow 1^+} \frac{1}{x^3 - 1}$. Ans: _____	b) $\lim_{x \rightarrow \infty} \frac{100x^2 - 1}{4x^3 - 1}$. Ans: _____	
4.	Evaluate the limit and justify every step using the Limit Law(s). a) $\lim_{x \rightarrow 1} [3x(2x - 1)^2]$. Ans: _____	b) $\lim_{x \rightarrow 4^-} \sqrt{16 - x^2}$. Ans: _____	
5.	Evaluate the limit analytically, if it exists: a) $\lim_{x \rightarrow 4} \frac{x^2 - 4x}{x^2 - 3x - 4}$. Ans: _____	b) $\lim_{x \rightarrow 2} \frac{x^3 - 8}{x - 2}$. Ans: _____	
Extra Space			

6. Using the ϵ, δ definition, prove rigorously that: $\lim_{x \rightarrow 1} (2 - 5x) = -3$.

8. Explain why the following functions are discontinuous at $x = 2$.

a) $f(x) = \frac{x^2 - 4}{x - 2}$.

b) $f(x) = \begin{cases} \frac{x^2 - 4}{x - 2} & x \neq 2 \\ 2 & x = 2 \end{cases}$

8. Use a limit method to find the rate of change of $f(x)$ at the point $x = 5$.

$f(x) = \sqrt{x - 1}$

Ans: _____.

9. The table below shows the price of gas in dollars for a period of 8 months:

t	1	2	3	4	5	6	7	8
p	1.89	1.98	2.12	2.24	2.45	2.73	2.94	3.12

a) What is the average increase in the first 4 months?.

b) Estimate the rate of increase in the 6th month.

Ans: _____.

Ans: _____.

10. Use the limit definition to find the derivative of $f(x) = \frac{3}{x + 2}$

Ans: _____.

Extra space.