

MATH 161 EXAM 1, Fall 2005

Show all work!		Name:	Score	
1.	The height of an ball thrown upwards is given by $h = 64t - 32t^2$ . Find the average velocity: a) In the interval $[2, 3]$	b) In the interval $[2, 2.1]$	1	
			2	
			3	
			4	
			5	
			6	
			7	
			8	
Ans:_____.		Ans:_____.		
2.	Guess the limit. Show a table or a graph as appropriate. a) $\lim_{x \rightarrow 0} (e^x - 1)/x$ . (Numerically)	b) $\lim_{x \rightarrow 0} (\sin 3x/6x)$ . (Graphically)	9	
			10	
			Tot	
			Ans:_____.	
3.	Determine the infinite limit by any method: a) $\lim_{x \rightarrow 2^+} \frac{7}{2-x}$	b) $\lim_{x \rightarrow -\infty} \frac{2x^3 + 5x - 1}{5x^3 + 4}$	Ans:_____.	
			Ans:_____.	
4.	Evaluate the limit and justify every step using the Limit Law(s). a) $\lim_{x \rightarrow 2} (x^3 - 5x + 1)$ .	b) $\lim_{x \rightarrow 3} \sqrt{25 - x^2}$ .	Ans:_____.	
			Ans:_____.	
5.	Evaluate the limit analytically, if it exists: a) $\lim_{t \rightarrow -3} \frac{t^2 - 9}{2t^2 + 7t + 3}$ .	b) $\lim_{t \rightarrow 4} \frac{\sqrt{t} - 2}{t - 4}$ .	Ans:_____.	
			Ans:_____.	
Extra Space				

6.	Using the $\epsilon, \delta$ definition, prove rigorously that: $\lim_{x \rightarrow 2} (3x - 4) = 2$
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8.	<p>Explain why the following functions are discontinuous at <math>x = 1</math>.</p> <p>a) <math>f(x) = \ln(x - 1)</math>.</p> <p>b) <math>f(x) = \begin{cases} x^2 - 1 &amp; x \leq 1 \\ x + 1 &amp; x &gt; 1 \end{cases}</math></p>
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8.	<p>Use a limit method to find the slope of the tangent line to <math>f(x)</math> at the point <math>x = 4</math>.</p> <p><math>f(x) = \sqrt{x}</math></p>
Ans: _____.	

9.	<p>The table below shows the increase in tax value <math>V(t)</math> in thousands of dollars for a house in San Leandro, California:</p> <table border="1" style="margin: 5px auto; border-collapse: collapse;"> <tr> <td style="padding: 2px 5px;">t</td> <td style="padding: 2px 5px;">1998</td> <td style="padding: 2px 5px;">1999</td> <td style="padding: 2px 5px;">2000</td> <td style="padding: 2px 5px;">2001</td> <td style="padding: 2px 5px;">2002</td> <td style="padding: 2px 5px;">2003</td> <td style="padding: 2px 5px;">2004</td> <td style="padding: 2px 5px;">2005</td> </tr> <tr> <td style="padding: 2px 5px;">V</td> <td style="padding: 2px 5px;">254</td> <td style="padding: 2px 5px;">275</td> <td style="padding: 2px 5px;">310</td> <td style="padding: 2px 5px;">368</td> <td style="padding: 2px 5px;">410</td> <td style="padding: 2px 5px;">520</td> <td style="padding: 2px 5px;">580</td> <td style="padding: 2px 5px;">650</td> </tr> </table>		t	1998	1999	2000	2001	2002	2003	2004	2005	V	254	275	310	368	410	520	580	650
t	1998	1999	2000	2001	2002	2003	2004	2005												
V	254	275	310	368	410	520	580	650												
a) What is the average increase from 2000-2004?.		b) Estimate the rate of increase in 2004.																		
Ans: _____.		Ans: _____.																		

10.	Use the limit definition to find the derivative of $f(x) = \frac{1}{x}$
Ans: _____.	

	Extra Credit (2 points) Write the precise definition of a limit.
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