Math 161 Exam 1, Spring 2021

Show all work!	Name:	Score	
1.	The displacement of an object thrown upwards in Mars is given by $y = 10t - 1.86t^2$. Find the average velocity:	1	
	a) In the interval $[2, 3]$.	2	
		3	
		4	
		5	
		6	
		7	
	Ans:_____.	8	
	b) In the interval $[2, 2.1]$.	9	
		10	
	Ans:_____.	Tot	
2.	Guess the limit. Show a table or a graph as appropriate.		
	a) $\lim_{x\to 0}(e^x - 1)/x$. (Numerically)		
	Ans:_____.		
	b) $\lim_{x\to 2^+}[x/(x-2)]$. (Graphically)		
	Ans:_____.		
3.	Evaluate the limit analytically, if it exists:		
	a) $\lim_{x\to 3} \dfrac{x^2 + 2x - 15}{x - 3}$.		
	Ans:_____.		
	b) $\lim_{x\to 9} \dfrac{\sqrt{x} - 3}{x - 9}$.		
	Ans:_____.		
4.	Find the following limits:		
	$\lim_{x\to\infty} \dfrac{2x^2 + 1}{3x^2 - 5}$.		
	Ans:_____.		
	b) $\lim_{x\to\infty} \dfrac{\sqrt{4x^6 + 9}}{3x^3 + 7}$.		
	Ans:_____.		
5.	Using the ϵ, δ definition, prove rigorously that: $\lim_{x\to 2}(5x - 7) = 3$.		
	Extra Space		

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6. Explain why each of the following functions are discontinuous at $x = 1$.

a) $f(x) = \dfrac{1}{x-1}$.

b) $f(x) = \begin{cases} \dfrac{x^2 - x}{x^2 - 1} & x \neq 1 \\ 1 & x = 1 \end{cases}$

7. Find the derivative of the function using the limit definition of derivative:

$f(x) = \dfrac{1}{x+4}$

Ans:_____.

8. Differentiate the following functions:

a) $f(x) = \sqrt{7x} - 3e^{x^2}$.

Ans:_____.

b) $f(x) = \sqrt{x^2 - 9}$.

Ans:_____.

9. Differentiate the following functions:

a) $f(x) = x^2 e^{3x}$

Ans:_____.

b) $f(x) = \dfrac{x^2 - 4}{x^2 + 4}$

Ans:_____.

10. Differentiate the following functions:

a) $f(x) = \sin^4(2x)$.

Ans:_____.

b) $f(x) = \sec(2e^x)$.

Ans:_____.

Extra space.