

Mr. Staszko

Math 101A Chapter 1 Sample Test

(5 points each problem. SHOW YOUR WORK!)

I. Explain and make a sketch of a function that satisfies the following conditions.

$$\lim_{x \rightarrow 2^-} f(x) = 3, \lim_{x \rightarrow 2^+} f(x) = 1, \text{ and } f(2) = 4$$

II. Determine the following limit numerically by completing the table.

$$\lim_{x \rightarrow 3} \frac{x-3}{\ln(x-2)} = \underline{\hspace{2cm}}$$

X	$f(x)$	x	$f(x)$
1.9		2.1	
1.99		2.01	
1.999		2.001	

III. Determine the following limit graphically (sketch graph below).

$$\lim_{x \rightarrow 3} \frac{x-3}{\ln(x-2)} = \underline{\hspace{2cm}}$$

IV. Determine the following limits algebraically.

a. $\lim_{x \rightarrow 0} \frac{x^2 - x - 12}{x^2 - 9} = \underline{\hspace{2cm}}$

b. $\lim_{x \rightarrow 3} \frac{x^2 - x - 12}{x^2 - 9} = \underline{\hspace{2cm}}$

c. $\lim_{x \rightarrow 3} \frac{x^2 - x - 12}{x^2 - 9} = \underline{\hspace{2cm}}$

d. $\lim_{x \rightarrow 0} \frac{\frac{1}{5+x} - \frac{1}{5}}{x} = \underline{\hspace{2cm}}$

e. $\lim_{x \rightarrow 0} \frac{3\sin(5x)}{x} = \underline{\hspace{2cm}}$

f. $\lim_{x \rightarrow 0} \frac{x}{\sqrt{x+9} - 3} = \underline{\hspace{2cm}}$

V. Given: $f(x) = \begin{cases} \sin x & \text{if } x < 0 \\ x^2 & \text{if } 0 \leq x < 2, \\ 4x - 3 & \text{if } x \geq 2 \end{cases}$ find:

a. $f(1) = \underline{\hspace{2cm}}$

b. $\lim_{x \rightarrow \pi/2} f(x) = \underline{\hspace{2cm}}$

c. $\lim_{x \rightarrow 0} f(x) = \underline{\hspace{2cm}}$

d. $\lim_{x \rightarrow 2^-} f(x) = \underline{\hspace{2cm}}$

e. $\lim_{x \rightarrow 2^+} f(x) = \underline{\hspace{2cm}}$

f. $\lim_{x \rightarrow 2} f(x) = \underline{\hspace{2cm}}$

i. For what values of x is $f(x)$ discontinuous? Show what type of discontinuity occurs at each value.

VI. Show if the following limits are $\pm\infty$.

a. $\lim_{x \rightarrow 2^+} \frac{5x}{x-2}$

b. $\lim_{x \rightarrow 2^-} \frac{5x}{x-2}$

VII. Find the equations of the asymptotes for the function, $f(x) = \frac{x^2}{x^2 - 9}$.