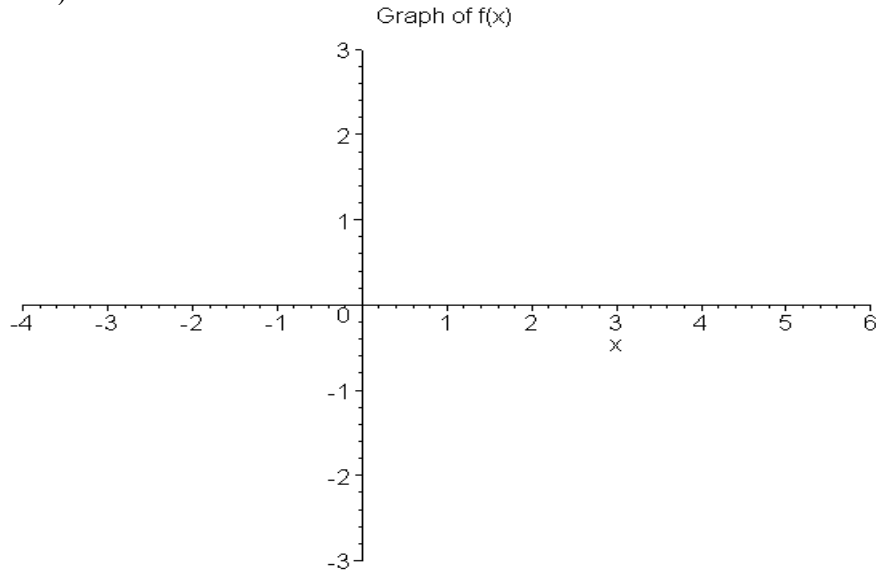


9/19/2001
Dr. Lunsford

MA303 Calculus I
Test 1

Name: _____
(100 Points Total)

I. Use the graph of the function f below to answer the following questions. (2 points each – 26 total)



$$\begin{array}{lll}
 f(-1) = \underline{\hspace{1cm}} & f(3) = \underline{\hspace{1cm}} & \lim_{x \rightarrow 4} f(x) = \underline{\hspace{1cm}} \\
 \lim_{x \rightarrow \infty} f(x) = \underline{\hspace{1cm}} & \lim_{x \rightarrow -\infty} f(x) = \underline{\hspace{1cm}} & \lim_{x \rightarrow -1^-} f(x) = \underline{\hspace{1cm}} \quad \lim_{x \rightarrow -1} f(x) = \underline{\hspace{1cm}} \\
 \lim_{x \rightarrow 3} f(x) = \underline{\hspace{1cm}} & \lim_{x \rightarrow 2^-} f(x) = \underline{\hspace{1cm}} & \lim_{x \rightarrow 0} f(x) = \underline{\hspace{1cm}}
 \end{array}$$

For the remaining questions, please write “true” or “false”, according to which is correct about the statement, in the space provided next to each statement.

_____ f is continuous at $x = 2$.

_____ f is continuous at $x = 4$.

_____ f is continuous at $x = 3$.

II. Complete the table below to find the value of the given limit. Chop (i.e. do not round) your answer to 8 decimal places. (5 points)

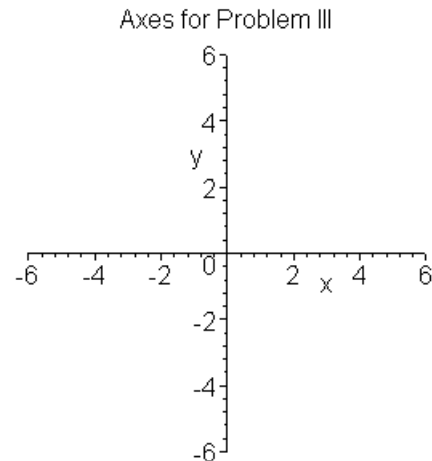
$$\lim_{x \rightarrow 0} \frac{1 - \cos x}{x} = \underline{\hspace{2cm}}$$

x	-0.1	-0.01	-0.001	.001	.01	.1
$f(x)$.00499995				.04995834

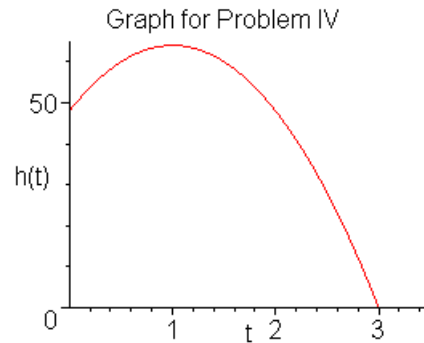
III. Use the function $f(x) = \frac{6-2x}{x+3}$ to answer the following questions. You must

show your work that justifies your answers. Clearly indicate your answers. (14 points total)

- Find the coordinates of all x and y intercepts of the function and label these points on the axes below. (4 points)
- Find the equations of all vertical asymptotes of the function. (3 points)
- Find the equations of all horizontal asymptotes of the function. (3 points)
- Use the information you found in parts (a)-(c) to draw a rough sketch of the function on the axes below. (4 points)



IV. At time $t = 0$ seconds a diver jumps from a 48 foot high diving board. The height of the diver (in feet) at time t seconds is given by $h(t) = -16t^2 + 32t + 48$. Find the average rate of change of the diver's height from $t = 1$ to $t = 3$ seconds. Draw the line on the graph below whose slope represents this average rate of change. (6 points)



V. Let $f(x) = \begin{cases} x^3 - x + 2, & x \geq 1 \\ \frac{5-x}{2x}, & x < 1 \end{cases}$. Use the definition of a continuous function to

determine if f is continuous at $x = 1$. You must show all work to justify your answer! Clearly indicate your answer. (6 points)

VI. Let $f(x) = 3x^2 - 4x + 1$. Find $\lim_{\Delta x \rightarrow 0} \frac{f(2 + \Delta x) - f(2)}{\Delta x}$. (8 points)

VII. Quick Limits. Find the indicated limits. (3 points each, 15 total)

1. $\lim_{x \rightarrow -1^+} \frac{x^2 + 1}{x + 3}$

2. $\lim_{x \rightarrow -\infty} \frac{3 - 7x - 11x^3}{4x^3 - 10x + 9}$

3. $\lim_{x \rightarrow \infty} \frac{x + 1}{x^2 + 1}$

4. $\lim_{x \rightarrow -\infty} (-3x^2 + 11x^5 - 7x^9)$

5. $\lim_{x \rightarrow 2^+} \frac{x + 1}{x - 2}$

VIII. More Interesting Limits. You must show at least one intermediate step to receive full credit for these problems. (5 each - 20 total)

1. $\lim_{x \rightarrow 2^-} \frac{2-x}{x^2-4x+4}$

2. $\lim_{x \rightarrow 0} \frac{\sin^2 5x}{x^2}$

3. $\lim_{x \rightarrow -\frac{\pi}{2}^+} \frac{x+1}{\cos x}$

4. $\lim_{x \rightarrow 0^+} \frac{\frac{1}{x+2} - \frac{1}{2}}{x}$