

There's obviously not enough room for you to work out problems on this paper. This will not be collected, but I highly suggest you understand how to complete each and every problem here! Solutions (along with the worksheet) will be posted on your Assignment page. (<http://www.chaoticgolf.com>)

**For questions 1 – 10, evaluate each limit without using your calculator.**

1.  $\lim_{x \rightarrow \frac{\pi}{2}} |x|$

2.  $\lim_{x \rightarrow \infty} \frac{x^2 + 5x - 3}{3x + 2}$

3.  $\lim_{x \rightarrow \infty} \frac{x^2 + 5x - 3}{3x^2 + 2}$

4.  $\lim_{x \rightarrow \infty} \frac{x^2 + 5x - 3}{3x^3 + 2}$

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

6.  $\lim_{x \rightarrow \infty} \frac{\sin x}{2x}$

7.  $\lim_{x \rightarrow 0} \frac{\tan(5x)}{\sin(3x)}$

8.  $\lim_{x \rightarrow \infty} \frac{4x^2 + 5x}{x - 3}$

9.  $\lim_{x \rightarrow \infty} \frac{5x - 7x^2}{4x^2 + 1}$

10.  $\lim_{x \rightarrow -3} \frac{|x + 3|}{x + 3}$

11. Use a table of values to evaluate the following limit:  $\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^x$

Recognize the number? ... Add this to your notecards under "Limits you should know". ... yeah ... those things you have to hand in before your test! ☺

12. Make a table of values (4 of them would work) to evaluate  $\lim_{x \rightarrow 2} \frac{x + 3}{x - 2}$ .

**For questions 13 and 14, find ALL asymptotes (vertical, horizontal, and oblique) and justify your response.**

13.  $y = \ln x$

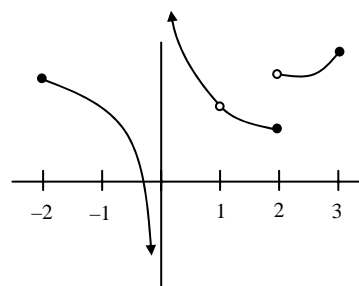
14.  $f(x) = \frac{(x + 2)(x - 3)}{(x + 2)(x - 1)}$

15. Let  $h(x) = \frac{(x - 1)(x + 3)}{(x + 3)(x - 2)}$ . Identify all values of  $c$  where the  $\lim_{x \rightarrow c} h(x)$  EXISTS.

16. Let  $g(x) = \frac{x^2 + 5x + 6}{x^2 + 3x + 2}$ .

- Find the domain of  $g(x)$ .
- Find the  $\lim_{x \rightarrow c} g(x)$  for all values of  $c$  where  $g(x)$  is not defined.
- Find any horizontal asymptotes and justify your response.
- Find any vertical asymptotes and justify your response.
- Write an extension to the function so that  $g(x)$  is continuous for all  $x < -1$ .

17. Using the function below, over what intervals does  $\lim_{x \rightarrow c} f(x)$  exist?



18. Let  $y = x^3 - 4x$ .

- Find the instantaneous slope for any value of  $x$ .
- Use your answer in part *a* to find the slope at  $x = -1$ .
- Find the equation of the tangent line when  $x = -1$ .
- Find the equation of the normal line when  $x = -1$ .

19. Let  $g(x) = \sqrt{x}$ . Find the instantaneous slope at  $x = 4$ .

**For questions 20 - 22, find the value of the parameter(s) that would make the function continuous. Justify your response using the definition of continuity.**

20.  $j(x) = \begin{cases} ax^2 & ; x < 1 \\ 4x - 2 & ; x \geq 1 \end{cases}$

21.  $k(x) = \begin{cases} \frac{\sin 3x}{x} & x \neq 0 \\ a & x = 0 \end{cases}$

22.  $f(x) = \begin{cases} a + 3x & ; x \leq -1 \\ bx^2 + 2 & ; x > -1 \end{cases}$

23. Let  $y = \frac{x^2 + 5x - 3}{x - 2}$ .

- Find the End Behavior Model
- Describe the End Behavior.
- Find all asymptotes.

24. If a line has a vertical tangent line at  $x = x_0$ , then  $\lim_{h \rightarrow 0} \frac{f(x_0 + h) - f(x_0)}{h} = +\infty$  or  $-\infty$ . Show that  $y = x^{2/5}$  has a vertical tangent line at  $x = 0$ .

25. Let  $k(x) = \frac{\sqrt{x} - 3}{x - 9}$ . Write an extension to the function so that it is continuous at  $x = 9$ .

**\*\*Finish your notecards. Check them online! Study them! Learn them! You will be asked to state definitions and use definitions to verify statements.**

**\*\*Review your homework ... some of you actually need to DO ALL OF IT FIRST! ... then make sure you still understand!**

**\*\*Review your notes!**

**\*\*Review your notecards AGAIN!**

**\*\*Is there a study session before the test? ... If so, where and when? ... ask someone if you don't know!**