

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. $y = \ln x$

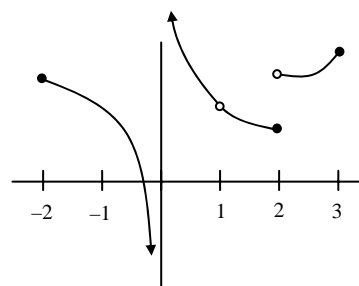
14. $f(x) = \frac{(x + 2)(x - 3)}{(x + 2)(x - 1)}$

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!**