

Instructions

- **Complete the problems as if this were an actual test.**
 - **70-80 minutes of uninterrupted time.** (this means no phones, Netflix, snapchat, etc....I promise you will survive 😊)
 - **Don't use your calculator on the NonCalc problems**
 - **No help from notes, friends, google, etc.**
- **After you have completed the problems, grade your test using the key provided.**
- **Try extra problems similar to the ones you missed until you feel like you understand those concepts.**

Non-Calculator

Find the following limits. Work must be shown on all problems with **proper limit notation**, where appropriate. If the limit does not exist, explain why.

1. $\lim_{x \rightarrow -5} \frac{2x^2 - 5}{x - 6}$

2. $\lim_{x \rightarrow -5} \frac{x + 5}{x^2 + 2x - 15}$

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

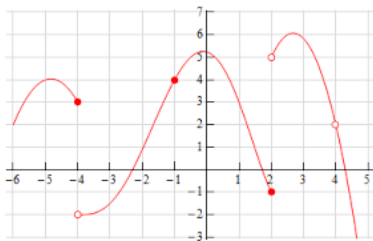
4. $\lim_{x \rightarrow 2} \frac{2 - \sqrt{6 - x}}{x - 2}$

5. $\lim_{x \rightarrow -5} \frac{\frac{6}{x+5} - 3}{x+3}$

6. $\lim_{x \rightarrow \infty} \frac{5x^2 + 6x - 5}{2x^2 - 6}$

7. $\lim_{x \rightarrow -\infty} \frac{(x+3)^2(2x-5)^3}{x^3 - 6}$

Use the graph of $f(x)$ to find the following.



8. $\lim_{x \rightarrow 2^+} f(x)$

11. $\lim_{x \rightarrow -4} f(x)$

9. $\lim_{x \rightarrow 2^-} f(x)$

12. $f(2)$

10. $\lim_{x \rightarrow 4} f(x)$

State the end behavior of each function using arrows.

13. $f(x) = \frac{(-2x+3)^3(x-3)^6}{x^2(x+2)^3}$

14. $f(x) = \frac{0.17x^{25} - 3.6x^{18}}{3 - 2x^5}$

Use the function $f(x) = 4x^2 - 5x$ for questions 15-18.

15. Find the derivative of $f(x)$ using the limit definition. $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$

16. Find the slope of the graph of $f(x)$ when $x = -3$.

17. Write the equation of the tangent line at $x = -3$. Leave your answer in point-slope form.

18. Find the x -value where the function has a horizontal tangent line.

19. Graph the following function. $f(x) = \begin{cases} 2x^2 + 3 & x \leq 1 \\ -3x + 2 & x > 1 \end{cases}$

Calculator Problems

20. Use the function $f(x) = \sqrt{x+3}$ for the following:

a. Find the domain of the function.

b. Find the derivative using the limit definition. $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$

c. At which value of x is the tangent line of $f(x)$ a horizontal line?

21. Use your calculator to find the following limits. Round to 3 decimal places as necessary.

a. $\lim_{x \rightarrow -3} \frac{\sin(x+3)}{x^2+5x+6}$

b. $\lim_{x \rightarrow 0} \frac{\sin x}{3x}$

22. Given $f(x) = \frac{26x+5}{x-2}$, find the following.

a. $f(3)$

b. $\frac{dy}{dx}$ when $x = 3$

c. Write the equation of the tangent line when $x = 3$.