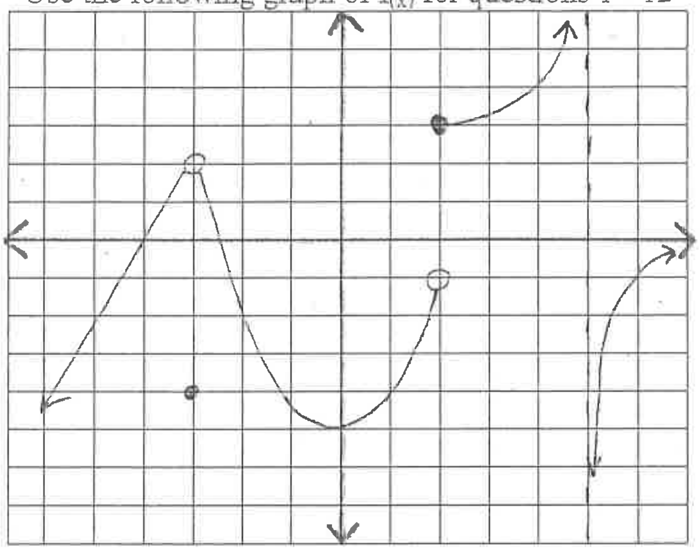
AP Calc AB
Limits, Continuity, Derivative
Test Review

Use the following graph of $f_{(x)}$ for questions 1 - 12



1. $\lim_{x\to -3^+} f(x) =$

2. $\lim_{x\to -3^-} f(x) =$

3. $\lim_{x\to -3} f(x) =$

4. $f(-3) =$

5. $\lim_{x\to 2^+} f(x) =$

6. $\lim_{x\to 2^-} f(x) =$

7. $\lim_{x\to 2} f(x) =$

8. $f(2) =$

9. $\lim_{x\to 5^+} f(x) =$

10. $\lim_{x\to 5^-} f(x) =$

11. $\lim_{x\to 5} f(x) =$

12. $f(5) =$

Find the indicated limit:

13. $\lim_{x\to 2} \frac{x^2-4}{x+5} =$

14. $\lim_{x\to -4} |x-7|+2 =$

15 $\lim_{x\to 3} \frac{\frac{1}{x}-\frac{2}{3}}{x+3} =$

16. $\lim_{x\to -7} \frac{x^2+3x-28}{x+7} =$

17. $\lim_{x\to 36} \frac{\sqrt{x}-6}{x-36} =$

18. $\lim_{x\to -5} \frac{\sqrt{x+5}}{2x+10} =$

19. $\lim_{x\to -2^+} \frac{\frac{1}{x}+\frac{1}{2}}{x+2} =$

20. $\lim_{x\to 7^-} [\![x-3]\!] =$

21. $\lim_{x\to 0} \frac{1}{x \csc x} =$

22. $\lim_{x\to 2^-} \frac{x^2+11x+18}{x-2} =$

23. $\lim_{x\to -4^-} \frac{x^3-4x}{x^2-16} =$

24. $\lim_{x\to\infty} \frac{3x-15}{x^2-25} =$

25. $\lim_{x\to -\infty} \frac{x^2-8x+15}{3x+15} =$

26. $\lim_{x\to\infty} \frac{-3x^2+7x-18}{x^2-4} =$

27. For which x value does $y = \frac{x^3-27}{x^2+5x-24}$ have a vertical asymptote?

28. For which x value does $y = \frac{2x^2-11x-21}{2x^2+13x+15}$ have point discontinuity?

29. For which x value does $y = \frac{|x-5|}{x-5}$ have a jump discontinuity?

30. For which x value does $y = \frac{x+3}{x^2+2x-3}$ have an infinite discontinuity?

31. Find the values that make $f(x)$ continuous. Justify your answer.

$$f(x) = \begin{cases} \sqrt{x+3} & x < -2 \\ ax^2 - 7 & x \ge -2 \end{cases}$$

32. Find the values that make $f(x)$ continuous. Justify your answer.

$$f(x) = \begin{cases} 7x+25 & x < -1 \\ ax^2 + b & -1 \le x < 3 \\ \log_x 9 & x \ge 3 \end{cases}$$

33. Use the limit definition of a derivative to find the following:

$f(x) = 2x^2 - 7x + 1$

A. Find $f'(x) =$ b. Find $f'(3) =$ c. Find $f'(-2) =$

34. Describe what the derivative of a function is as it relates to the graph of the function.

35. Use the alternate form of the limit definition to find $f'(4) =$ if $f(x) = -x^2 - 5x$.

36. Find the equation of the line tangent to the curve $f(x) = -2x^2 - 3x$ at $x = 2$.

37. Find the equation of the line orthogonal to the curve $f(x) = \frac{6}{x}$ at $x = 3$.

38. Does the function $f(x) = x^4 - 5x^2 + 2$ have a root in the interval [2, 3]?

39. If $f(x) = x^2 - \sqrt{x+2}$, show there is a number c such that $f(c) = 7$.

The functions f and g are differentiable for all real numbers, and f is strictly increasing. The table below gives values of the functions and their first derivatives at selected values of x. The function h is given by $h(x) = g(f(x)) + 4$.

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
2	2	1	4	6
4	3	4	9	1
6	8	8	-3	4
8	14	11	2	-3

40. Explain why there must be a value r for $2 < r < 6$ such that $h(r) = 7$

41. Find the equation of the line normal to $f(x)$ at $x = 4$

42. Find the equation of the line tangent to $g(x)$ at $x = 8$

43. Explain why there must be a point where the graph of g has a horizontal tangent line.

44. Sketch a possible graph for f(x) given the following criteria.

$\lim_{x\to\infty} f(x) = 4$

$\lim_{x\to-\infty} f(x) = -\infty$

$\lim_{x\to 2^-} f(x) = \infty$

$\lim_{x\to 2^+} f(x) = -\infty$

$\lim_{x\to 5} f(x) = 2$

$\lim_{x\to -3^-} f(x) = -1$

$\lim_{x\to -3^+} f(x) = 3$

$f(-3) = 5$

$f(-7) = 1$

$f(5)$ *is undefined*