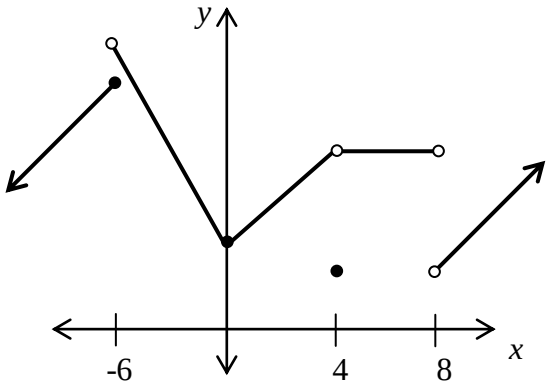
AP Calculus AB 1.2 and 1.4 Limits Numerically/Graphically

Name:_____

No Calculator!!!

Use the piece-wise function to answer #1 to #8.

$$f(x)=\begin{cases} x+22, & x\le -6 \\ -\frac{13}{6}x+6, & -6<x<0 \\ \frac{3}{2}x+6, & 0\le x<4 \\ 4, & x=4 \\ 12, & 4<x<8 \\ x-4, & x>8 \end{cases}$$



Use the function and its graph to classify the discontinuities as removable or essential.

1. at $x=-6$
2. at $x=0$
3. at $x=4$
4. at $x=8$
5. at $x=10$

Use the function and its graph to find each limit.

6. $\lim_{x\to -6} f(x)=$
7. $\lim_{x\to 0} f(x)=$
8. $\lim_{x\to 4} f(x)=$
9. $\lim_{x\to 8} f(x)=$
10. $\lim_{x\to 10} f(x)=$

Use the piece-function to evaluate the limits.

$$f(x)=\begin{cases} x+3, & x<0 \\ x-3, & x\ge 0 \end{cases}$$

11. $\lim_{x\to 0^-} f(x)=$
12. $\lim_{x\to 0^+} f(x)=$
13. $\lim_{x\to 0} f(x)=$
14. $\lim_{x\to -1} f(x)=$
15. $\lim_{x\to 2} f(x)=$

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16. Let $f(x) = \begin{cases} x^2 - 4 & \text{for } x < 3 \\ 7 & \text{for } x = 3 \\ 2x + 4 & \text{for } x > 3 \end{cases}$

Find:

a) $f(0) =$

b) $f(3) =$

c) $f(5) =$

d) $\lim_{x \to 0} f(x) =$

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

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

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

h) Is $f(x)$ continuous at $x = 3$?

If not, classify the discontinuity.

Use the piece-function to evaluate the value of f and the limits.

$$f(x) = \begin{cases} x^2, & x \neq 2 \\ 6, & x = 2 \end{cases}$$

17. Find $f(2) =$

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

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

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

Use the piece-function to evaluate the value of f and the limits.

$$f(x)=\begin{cases} x+2\ , & x<0 \\ \sqrt{x}+2\ , & 0\le x<4 \\ \ln x\ , & x\ge 4 \end{cases}$$

21. Find $f(0)=$ 22. $\lim_{x\to 0} f(x)=$ 23. Find $f(4)=$ 24. $\lim_{x\to 4} f(x)=$

25. If $f(x)=\begin{cases} 3x+2 & \text{for } x<2 \\ 9 & \text{for } x=2 \\ 6x-4 & \text{for } x>2 \end{cases}$, then $\lim_{x\to 2} f(x)$ is

(A) 6 (B) 7 (C) 8 (D) 9 (e) undefined

26. Is $f(x)$ in #25 continuous at $x = 2$? If not, classify the discontinuity.

Evaluate the limits numerically by making a table of values near $x = c$.

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

28. $\lim_{x\to 1} \frac{1}{(x-1)^2} =$

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

30. $\lim_{x\to 4} \frac{4-x}{2-\sqrt{x}} =$

31. $\lim_{x\to 0} x\ln|x| =$

32. $\lim_{x\to -1} \frac{x^2-x+1}{5x-5} =$

33. $\lim_{x\to 0}\left(\frac{1}{x}-\frac{1}{\sin x}\right) =$

34. $\lim_{x\to +\infty}\left(1+\frac{1}{x}\right)^x =$

35. $\lim_{h\to 0} \frac{(h+2)^2-2^2}{h} =$

36. $\lim_{p\to +\infty} \frac{p^2+3p-9}{2p^2-5} =$

37. $\lim_{t\to +\infty} \frac{t^3+8t}{2t^2-4t} =$

38. $\lim_{n\to +\infty} \frac{n-1}{2n^3+3n^2+8} =$

ANSWERS:

1) Essential	6) undefined	11) 3	16a) -4	16f) 10	19) 4	24) undefined	29) 8	34) e
2) Neither	7) 6	12) -3	b) 7	g) undefined	20) 4	25) C	30) 4	35) 4
3) Removable	8) 12	13) undefined	c) 14	h) No, Ess	21) 2	26) No, Rem	31) 0	36) 1/2
4) Essential	9) undefined	14) 2	d) -4	17) 6	22) 2	27) undefined	32) -3/5	37) undefined
5) Neither	10) 6	15) -1	e) 5	18) 4	23) ln 4	28) undefined	33) 0	38) 0