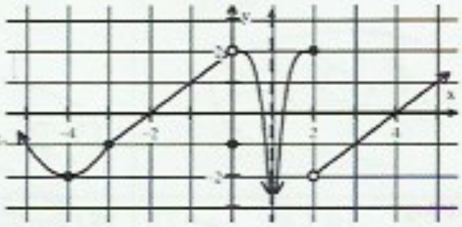
Unit 1 HW BC Name:

Directions: Use the graph of $f(x)$, show below, to find the following limits and function values.

1. State and classify all discontinuities for $f(x)$.



f(0), f(1), f(2) jump non-removable
Hole removable VA non-remove

2. Find each limit if it exists.

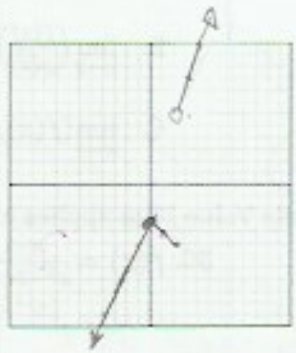
A. $\lim_{x\to -4} f(x) =$ -2	B. $\lim_{x\to 0} f(x) =$ 2	C. $\lim_{x\to -1} f(x) =$ 1	D. $f(0) =$ DNE
E. $\lim_{x\to 0^-} f(x) =$ 2	F. $\lim_{x\to 1} f(x) =$ DNE	G. $f(1) =$ DNE	H. $\lim_{x\to 2} f(x) =$ DNE
I. $\lim_{x\to 2^-} f(x) =$ 2	J. $\lim_{x\to 2^+} f(x) =$ -2	K. $f(2) =$ 2	L. $\lim_{x\to 4^+} f(x) =$ 0

Directions: Use the following functions for problems 3-9.

Given

$$f(x) = \begin{cases} 2x-3, if\ x \le 0 \\ -x-3, 0 < x \le 2 \\ 3x, x > 2 \end{cases}$$

3. Graph f(x)



4. $\lim_{x\to 0} f(x) =$ -3

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

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

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

8. $f(2) =$ -5

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

Directions: Determine all discontinuities and classify them as removable or non-removable.

10. $f(x) = \frac{2x-3}{x+1}$ ~~disgow~~ VA @ (-1,-5) irremovable

11. $f(x) = x^3 + 2x^2 - 4x - 8$ ~~no discontinuities~~ continuous $(-\infty, \infty)$

Directions: Find each of the following limits by hand, simplify your answers. Use appropriate notation.

12. $\lim_{x\to 0}(2x-5)$ = -5
$\lim_{x\to 0} = -5$

13. $\lim_{x\to 2^-}(x^2-5x+4)$ = 4-10+4
$\lim_{x\to 2^-}(x^2-5x+4) = -2$

14. $\lim_{x\to 2}\frac{2x-5}{\sqrt{x+7}}$ = $\frac{4-5}{3} = -\frac{1}{3}$
$\lim_{x\to 2}\frac{2x-5}{\sqrt{x+7}} = -\frac{1}{3}$

15. $\lim_{x\to -2}|3x+5|$ = |-6+5|
$\lim_{x\to -2}|3x+5| = 1$

16. $\lim_{x\to \pi}\tan x$
tan π = undefined
DNE

17. $\lim_{x\to 7}\csc\frac{\pi x}{6}$ = $\frac{7\pi}{6}$ = -2
$\lim_{x\to 7}\csc\frac{\pi x}{6} = -2$

18. $\lim_{x\to 5}[.5x-3]$ = |2.5-3| = 0.5
$\lim_{x\to 5}|5x-3| = 0.5$

19. $\lim_{x\to -2} x\ln e^x$ = -2 ln e^-2 = 4
$\lim_{x\to -2} x\ln e^x = 4$

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