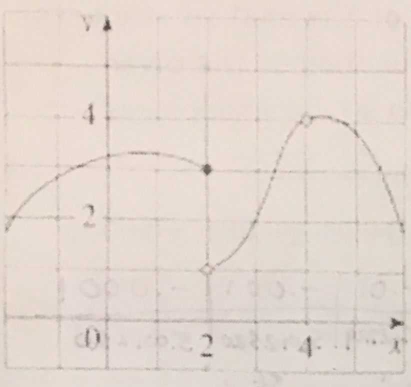
AP Calculus AB

Finding a Limit Graphically

Name________________________

Limits, Cont., & R.O.C Day 3



Graph of $f(x)$

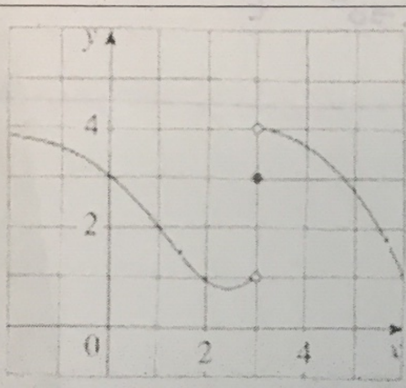
1. Use the given graph f to state the value of each quantity, if it exists. If it does not exist, explain why.

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

B.) $\lim_{x\to 2^+} f(x) = 1$ E.) $\lim_{x\to 4} f(x) = 4$

C.) $\lim_{x\to 2} f(x)$ DNE F.) $f(4)$ undefined

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



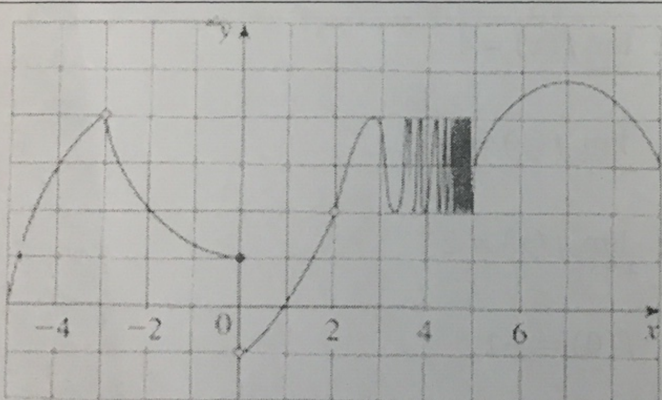
Graph of $f(x)$

2. Use the given graph f to state the value of each quantity, if it exists. If it does not exist, explain why.

A.) $\lim_{x\to 1} f(x) = 2$ D.) $\lim_{x\to 3} f(x)$ DNE

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

C.) $\lim_{x\to 3^+} f(x) = 4$



Graph of $h(x)$

3. Use the given graph h to state the value of each quantity, if it exists. If it does not exist explain why.

A.) $\lim_{x\to -3^-} h(x)$ 4

B.) $\lim_{x\to -3^+} h(x)$ 4

C.) $\lim_{x\to -3} h(x)$ 4

D.) $h(-3)$ undefined

E.) $\lim_{x\to 0^-} h(x)$ 1

F.) $\lim_{x\to 0^+} h(x)$ -1

G.) $\lim_{x\to 0} h(x)$ DNE

H.) $h(0)$ 1

I.) $\lim_{x\to 2} h(x)$ 2

J.) $h(2)$ undefined

K.) $\lim_{x\to 5^+} h(x)$ 3

L.) $\lim_{x\to 5^-} h(x)$

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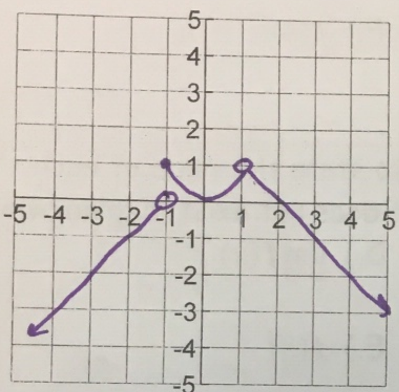
7. Sketch the graph of the function and use it to determine the values of a for which $\lim_{x \to a} f(x)$ exists.

$$f(x) = \begin{cases} 1 + x & \text{if } x < -1 \\ x^2 & \text{if } -1 \le x < 1 \\ 2 - x & \text{if } x \ge 1 \end{cases}$$



Limit exists for all values $a \neq -1$

8. Guess the value of the limit (if it exists) by evaluating the function at the given numbers (correct to six decimal places).

$$\lim_{t \to 0} \frac{e^{5t} - 1}{t}$$

$$t = \pm 0.5, \pm 0.1, \pm 0.01, \pm 0.001, \pm 0.0001$$

t	-.5	-.1	-.01	-.001	-.0001
y	1.835830	3.934693	4.877057	4.987520	4.998750

$$\lim_{t \to 0^-} \frac{e^{5t}-1}{t} = 5$$

t	.5	.1	.01	.001	.0001
y	22.364987	6.487212	5.127109	5.012520	5.001250

$$\lim_{t \to 0^+} \frac{e^{5t}-1}{t} = 5$$

$$\therefore \lim_{t \to 0} \frac{e^{5t}-1}{t} = 5$$

9-12: If you were going to sketch a graph of a function with the following conditions, state what each condition means.

9. $\lim_{x \to 0^-} f(x) = -1$

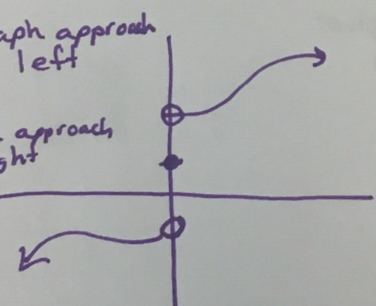
open circle, graph approach $(0,-1)$ from the left

$\lim_{x \to 0^+} f(x) = 2$

open circle, graph approach $(0,2)$ from the right

$f(0) = 1$

closed circle at $(0,1)$



10. $\lim_{x \to 0} f(x) = 1$ open circle, graph approach $(0,1)$ from left and right

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

open circle, graph approaching $(3,-2)$ from left

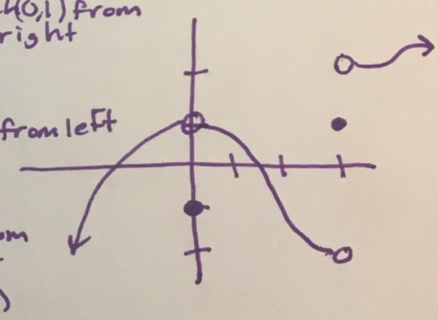
$\lim_{x \to 3^+} f(x) = 2$

open circle, graph approaching $(3,2)$ from right

$f(0) = -1$

closed circle at $(0,1)$

$f(3) = 1$ closed circle at $(3,1)$



11. $\lim_{x \to 3^+} f(x) = 4$

open circle, graph approach $(3,4)$ from right

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

open circle, graph approach $(3,2)$ from left

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

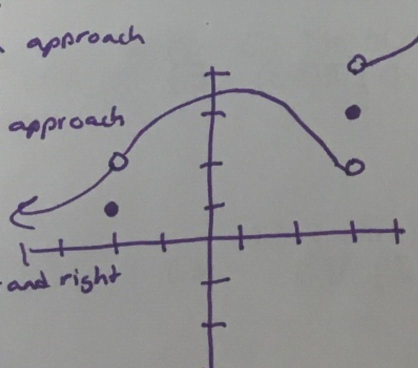
open circle, graph approach $(-2,2)$ from left and right

$f(3) = 3$

closed circle $(3,3)$

$f(-2) = 1$

closed circle $(-2,1)$



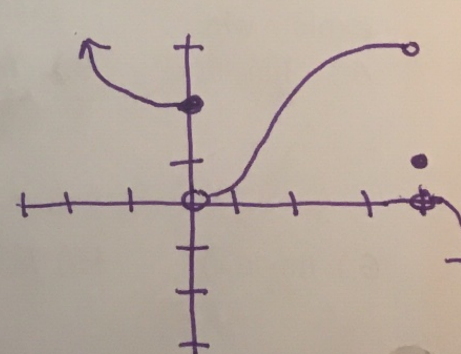
12. $\lim_{x \to 0^-} f(x) = 2$

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

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

$\lim_{x \to 4^+} f(x) = 0$

$f(0) = 2$ and $f(4) = 1$



Graphs vary