

hole \rightarrow approaches same value from each side
 V.A. \rightarrow approaches $+\infty$ or $-\infty$ on each side

AP Calculus AB

Name: Answer Key*

Unit 1 - Day 1 Assignment

Numerical & Graphical Approach to Finding Limits

Below are tables of values for given types of functions. For each table, the type of function represented by the table is given. Use your knowledge of the numerical behavior of each type of function to find the indicated limits. For limits that do not exist, write D.N.E.

1. Exponential Function

x	-7	-4	-1	2	5	8	11
$H(x)$	-125	-13	1	2.75	2.969	2.996	2.999

a) $\lim_{x \rightarrow -\infty} H(x) = -\infty$

b) $\lim_{x \rightarrow -1} H(x) = 1$

c) $\lim_{x \rightarrow \infty} H(x) = 3$

2. Rational Function

x	-1000	-2.001	-2	-1.999	0.999	1	1.001	1000
$G(x)$	0.998	0.333	Undefined	0.333	-1999	Undefined	2001	1.002

a) $\lim_{x \rightarrow -\infty} G(x) = 1$

b) $\lim_{x \rightarrow 2^-} G(x) = 1/3$
left

c) $\lim_{x \rightarrow 2^+} G(x) = 1/3$
Right

d) $\lim_{x \rightarrow -2} G(x) = 1/3$

e) $\lim_{x \rightarrow 1^-} G(x) = -\infty$
left

f) $\lim_{x \rightarrow 1^+} G(x) = \infty$
Right

g) $\lim_{x \rightarrow 1} G(x) = \text{D.N.E.}$

h) $\lim_{x \rightarrow \infty} G(x) = 1$

3. Rational Function

x	-10000	0.999	1	1.001	3.999	4	4.001	10000
$H(x)$	1.9999	-2.331	Undefined	-2.335	-12998	Undefined	13002	2.001

a) $\lim_{x \rightarrow \infty} H(x) = 2$

b) $\lim_{x \rightarrow 1} H(x) = -2.333$

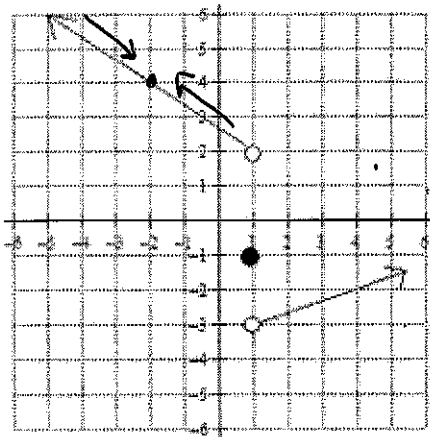
c) $\lim_{x \rightarrow 4^+} H(x) = \infty$
Right

d) $\lim_{x \rightarrow 4^-} H(x) = -\infty$
left

e) $\lim_{x \rightarrow 1} H(x) = \text{D.N.E.}$

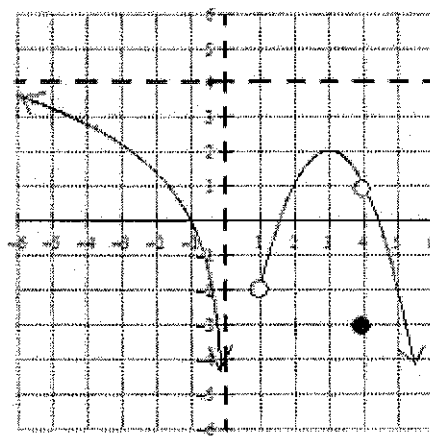
If they exist, determine the indicated values below each graph. For limits that do not exist, write D.N.E.

4. The graph of $h(x)$ is given.



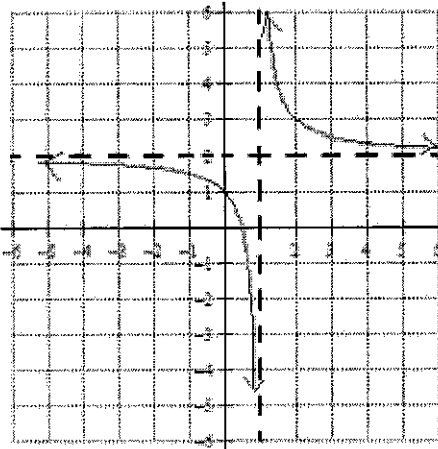
- a) $\lim_{x \rightarrow 0^-} h(x) = 2$ b) $\lim_{x \rightarrow 0^+} h(x) = -3$
 left Right
 c) $\lim_{x \rightarrow 1} h(x) = \text{D.N.E.}$ d) $h(1) = -1$
 e) $h(-2) = 4$ f) $\lim_{x \rightarrow -2} h(x) = 4$

5. The graph of $g(x)$ is given.



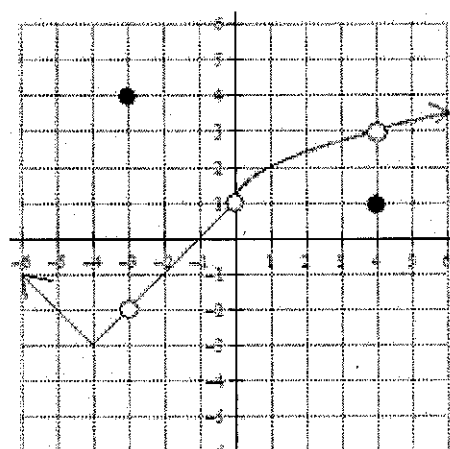
- a) $\lim_{x \rightarrow 0^-} g(x) = -\infty$ b) $\lim_{x \rightarrow 0^+} g(x) = -2$
 left Right
 c) $\lim_{x \rightarrow \infty} g(x) = 4$ d) $\lim_{x \rightarrow 4} g(x) = 1$
 e) $g(4) = -3$ f) $\lim_{x \rightarrow 3} g(x) = 2$

6. The graph of $f(x)$ is given.



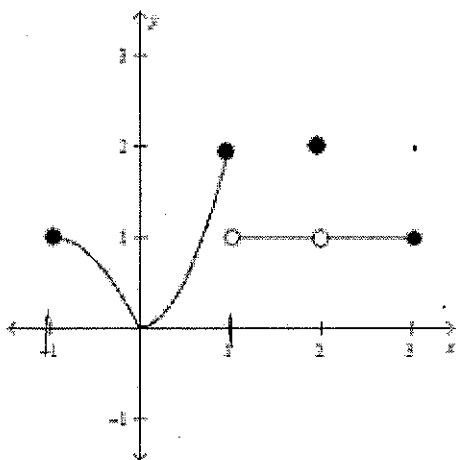
- a) $\lim_{x \rightarrow 0^+} f(x) = 1$ b) $\lim_{x \rightarrow -\infty} f(x) = 2$
 c) $\lim_{x \rightarrow \infty} f(x) = 2$ d) $\lim_{x \rightarrow 1^+} f(x) = \infty$
 e) $\lim_{x \rightarrow 1^-} f(x) = -\infty$ f) $\lim_{x \rightarrow 1} f(x) = \text{D.N.E.}$

7. The graph of $q(x)$ is given.



- a) $\lim_{x \rightarrow 0} q(x) = 1$ b) $\lim_{x \rightarrow 3} q(x) = -2$
 c) $\lim_{x \rightarrow 4} q(x) = 3$ d) $\lim_{x \rightarrow 4} q(x) = -3$
 e) $q(-3) = 4$ f) $q(4) = 1$

Given the graph of the function, $g(x)$, below, determine if the statements are true or false. For statements that are false, explain why.



8. $\lim_{x \rightarrow 1} g(x) = 2$ **FALSE**

$\lim_{x \rightarrow 1^-} g(x) \neq \lim_{x \rightarrow 1^+} g(x)$

9. $\lim_{x \rightarrow c} g(x)$ exists for every value of c on the interval $(-1, 1)$.

TRUE Graph is continuous & no jumps or asymptotes.

10. $\lim_{x \rightarrow 2} g(x)$ does not exist.

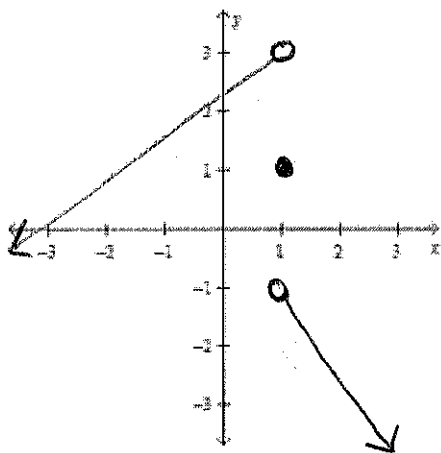
False

$\lim_{x \rightarrow 2^-} g(x) = \lim_{x \rightarrow 2^+} g(x) = 1$

Sketch a graph of a function that fits the requirements described below.

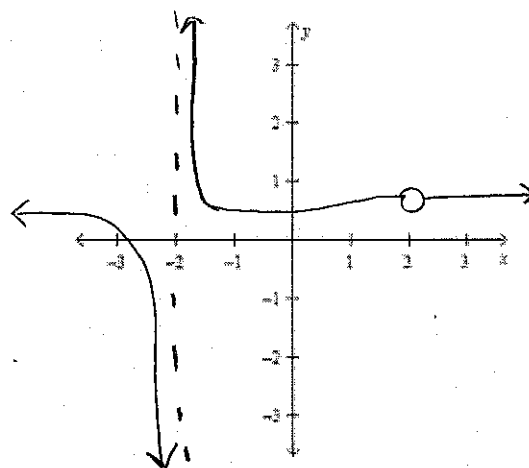
11. $\lim_{x \rightarrow 1^-} f(x) = 3$ $\lim_{x \rightarrow 1^+} f(x) = -1$ $f(1) = 1$

1 **jump in graph**



12. $\lim_{x \rightarrow -2^-} f(x) = -\infty$ $\lim_{x \rightarrow -2^+} f(x) = \infty$

$f(2)$ is undefined but $\lim_{x \rightarrow 2} f(x)$ exists. **hole at $x=2$**



13. In exercise 11, does $\lim_{x \rightarrow 1} f(x)$ exist? Explain why or why not.

NO, the $\lim_{x \rightarrow 1} f(x)$ does not exist because $\lim_{x \rightarrow 1^-} f(x) \neq \lim_{x \rightarrow 1^+} f(x)$.