Homework 1.1

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) $\lim_{x\to-\infty} H(x) =$ $-\infty$ b) $\lim_{x\to-1} H(x) =$ 1 c) $\lim_{x\to\infty} H(x) =$ 3

2. Rational Function

Hole VA

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) $\lim_{x\to-\infty} G(x) =$ 1 b) $\lim_{x\to-2^-} G(x) =$ $\frac{1}{3}$ c) $\lim_{x\to-2^+} G(x) =$ $\frac{1}{3}$

d) $\lim_{x\to-2} G(x) =$ $\frac{1}{3}$ e) $\lim_{x\to1^-} G(x) =$ $-\infty$ (DNE) f) $\lim_{x\to1^+} G(x) =$ ∞ (DNE)

g) $\lim_{x\to1} G(x) =$ DNE h) $\lim_{x\to\infty} G(x) =$ 1

3. Rational Function

$\lim_{x\to-\infty} H(x) = 2$ Hole VA $x\to\infty$ $y\to2$

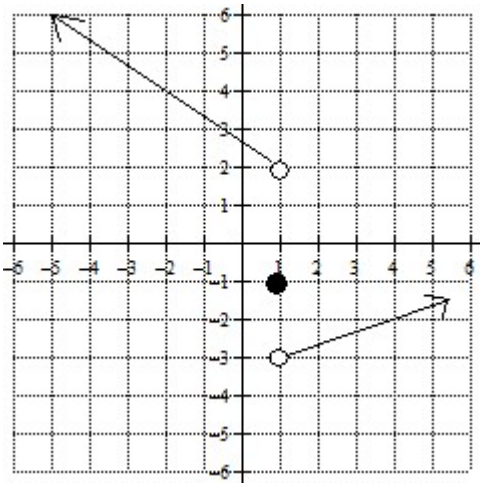
x	-10000	0.999	1	1.001	3.999	4	4.001	10000
$H(x)$	1.9999	-2.331	Undefined	-2.335	-12998	Undefined	13002	2.001

a) $\lim_{x\to\infty} H(x) =$ 2 b) $\lim_{x\to1} H(x) =$ $-8/3$ c) $\lim_{x\to4^+} H(x) =$ ∞

d) $\lim_{x\to4^-} H(x) =$ $-\infty$ e) $\lim_{x\to4} H(x) =$ DNE

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.

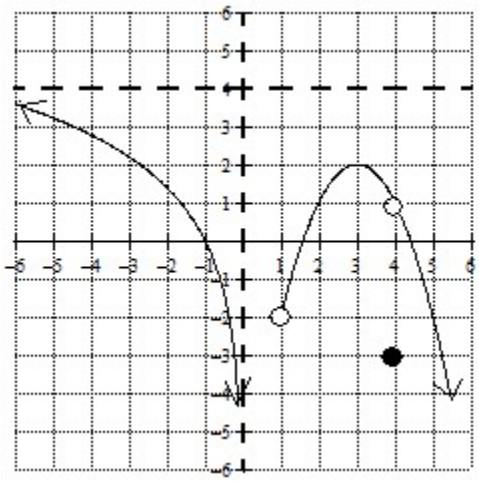


a) $\lim_{x\to 1^-} h(x) =$ 2 b) $\lim_{x\to 1^+} h(x) =$ −3

c) $\lim_{x\to 1} h(x) =$ DNE d) $h(1) =$ −1

e) $h(-2) =$ 4 f) $\lim_{x\to -2} h(x) =$ 4

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

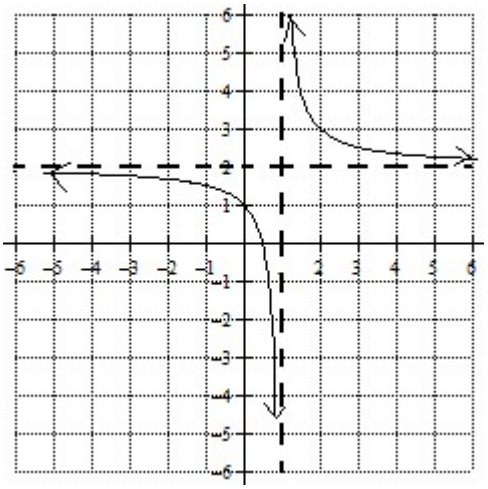


a) $\lim_{x\to 0^-} g(x) =$ $-\infty$ b) $\lim_{x\to 1^+} g(x) =$ −2

c) $\lim_{x\to -\infty} g(x) =$ 4 d) $\lim_{x\to 4} g(x) =$ 1

e) $g(4) =$ −3 f) $\lim_{x\to 3} g(x) =$ 2

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

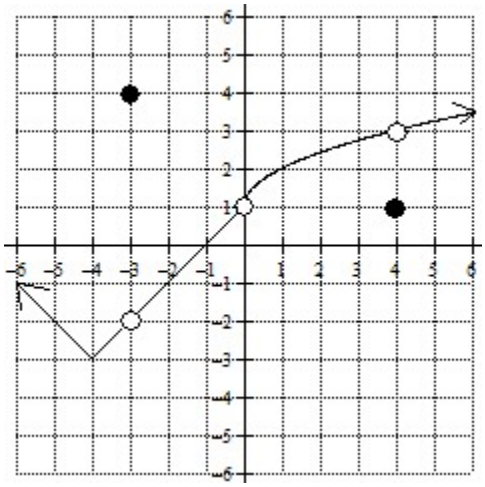


a) $\lim_{x\to 0} f(x) =$ 1 b) $\lim_{x\to -\infty} f(x) =$ 2

c) $\lim_{x\to \infty} f(x) =$ 2 d) $\lim_{x\to 1^+} f(x) =$ ∞

e) $\lim_{x\to 1^-} f(x) =$ $-\infty$ f) $\lim_{x\to 1} f(x) =$ DNE

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

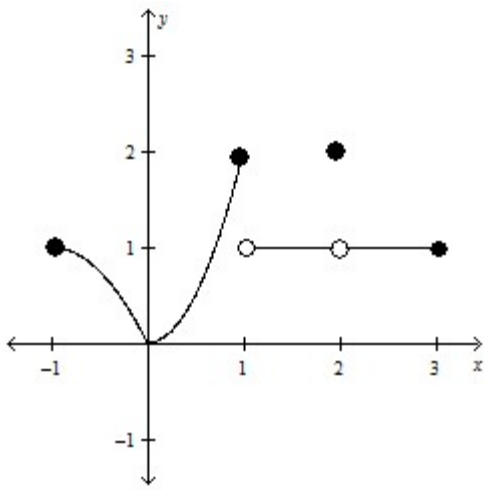


a) $\lim_{x\to 0} q(x) =$ 1 b) $\lim_{x\to -3} q(x) =$ −2

c) $\lim_{x\to 4} q(x) =$ 3 d) $\lim_{x\to -4} q(x) =$ −3

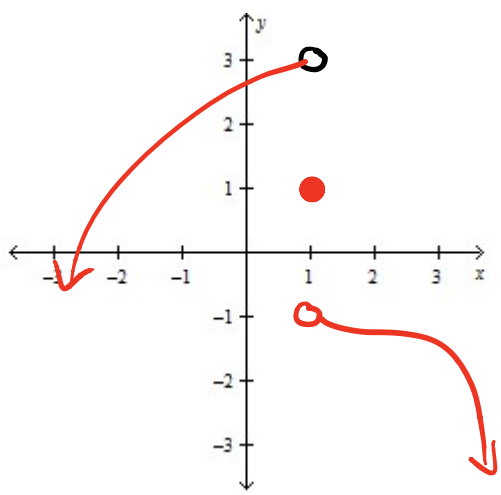
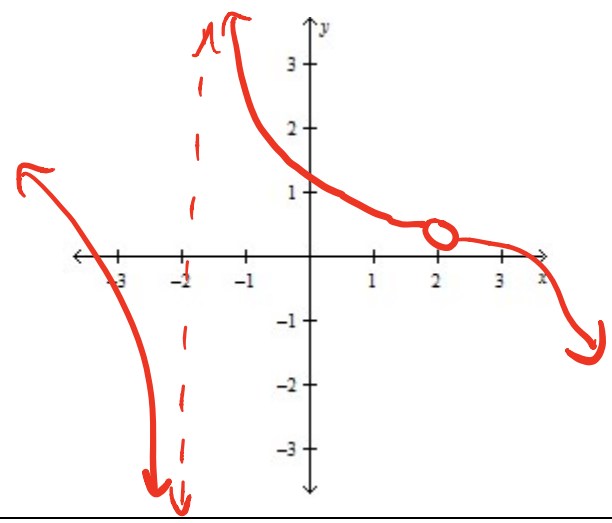
e) $q(-3) =$ 4 f) $q(4) =$ 1

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. $\lim_{x\to 1} g(x) = 2$ False	$\lim_{x\to 1^-} g(x) = 2 \neq \lim_{x\to 1^+} g(x) = 1$ $\therefore \lim_{x\to 1} g(x)$ dne
9. $\lim_{x\to c} g(x)$ exists for every value of c on the interval $(-1, 1)$. True	
10. $\lim_{x\to 2} g(x)$ does not exist. False	$\lim_{x\to 2^-} g(x) = 1 = \lim_{x\to 2^+} g(x)$ $\therefore \lim_{x\to 2} g(x)$ exists

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

11. $\lim_{x\to 1^-} f(x) = 3$ $\quad \lim_{x\to 1^+} f(x) = -1$ $\quad f(1) = 1$ 	12. $\lim_{x\to -2^-} f(x) = -\infty$ $\quad \lim_{x\to -2^+} f(x) = \infty$ $f(2)$ is undefined but $\lim_{x\to 2} f(x)$ exists. 

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

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

$\therefore \lim_{x\to 1} f(x)$ dne.