

SET ONE: Exercises on Limits -- Graphical & Numerical

[1] Evaluate the limits based on the values given in the table.

	$x = 3.9$	$x = 3.99$	$x = 3.999$	$x = 4$	$x = 4.001$	$x = 4.01$	$x = 4.1$
$f(x)$	0.3	0.333	0.333333	1	0.333333	0.333333	0.3333
$g(x)$	-3.9	-3.99	-3.999	-4	-4.999	-4.99	-4.9
$h(x)$	2.4	2.49	2.499	dne	2.499	2.49	2.45

[a] $\lim_{x \rightarrow 4} f(x)$

[b] $\lim_{x \rightarrow 4} g(x)$

[c] $\lim_{x \rightarrow 4} h(x)$

[2] Refer to the table in the previous problem.

[a] List any functions with a jump discontinuity $x = 4$. _____

[b] List any functions with a removable discontinuity $x = 4$. _____

[3] Evaluate the limits based on the values given in the table.

	$x = -2.1$	$x = -2.01$	$x = -2.001$	$x = -2$	$x = -1.999$	$x = -1.99$	$x = -1.9$
$p(x)$	-4.487	-4.4998	-4.49999	dne	-4.50002	-4.5033	-4.7
$q(x)$	-4.998	-4.099	-4.001	-5	-4.998	-4.921	-4.5
$r(x)$	2.89	2.997	2.99995	3	3.0004	3.003	3.02
$s(x)$	3.1	3.01	3.001	4	3.001	3.01	3.1

[a] $\lim_{x \rightarrow -2} p(x)$

[b] $\lim_{x \rightarrow -2} q(x)$

[c] $\lim_{x \rightarrow -2} r(x)$

[d] $\lim_{x \rightarrow -2} s(x)$

[4] Refer to the table in the previous problem.

[a] List any functions with a jump discontinuity $x = -2$. _____

[b] List any functions with a removable discontinuity $x = -2$. _____

[5] The graph of $y = f(x)$ is given. Evaluate the following expressions.

[a] $\lim_{x \rightarrow -3} f(x)$

[b] $\lim_{x \rightarrow -3^+} f(x)$

[c] $\lim_{x \rightarrow -3} f(x)$

[d] $f(-3)$

[e] $\lim_{x \rightarrow -2^-} f(x)$

[f] $\lim_{x \rightarrow -2^+} f(x)$

[g] $\lim_{x \rightarrow -2} f(x)$

[h] $f(-2)$

[i] $\lim_{x \rightarrow 2^-} f(x)$

[j] $\lim_{x \rightarrow 2^+} f(x)$

[k] $\lim_{x \rightarrow 2} f(x)$

[l] $f(2)$

[m] $\lim_{x \rightarrow 3} f(x)$

[n] $\lim_{x \rightarrow 3^+} f(x)$

[o] $\lim_{x \rightarrow 3} f(x)$

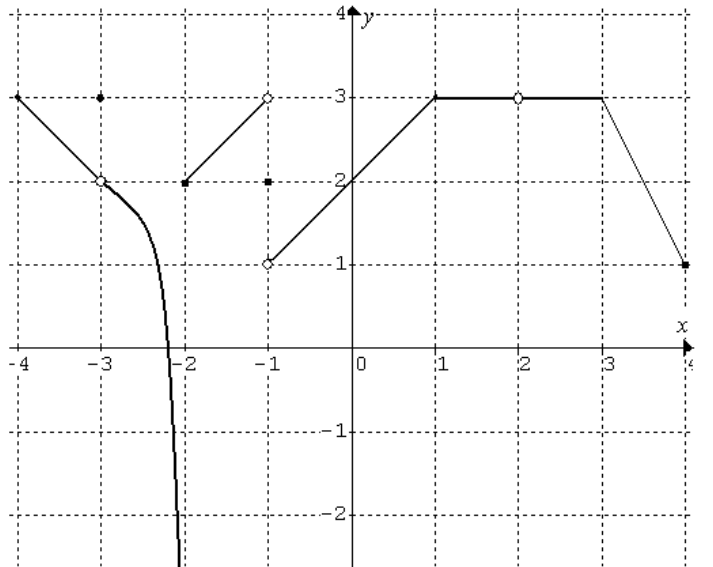
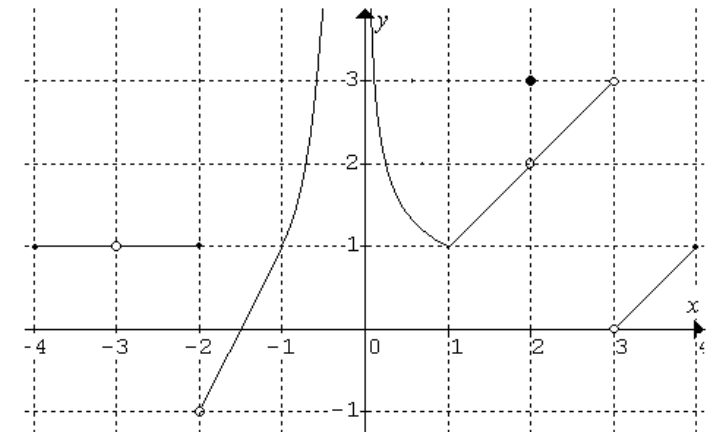
[p] $f(3)$

[6] Refer to the graph of $y = f(x)$ shown above.

Use the three-way test for continuity to explain how you know that f is discontinuous at each of the following points:

[a] -3 [b] -2 [c] 2 .

[7] The graph of $y = f(x)$ is given. Evaluate the following expressions.



- [a] $\lim_{x \rightarrow 3^-} f(x)$ [b] $\lim_{x \rightarrow 3^+} f(x)$
 [c] $\lim_{x \rightarrow 3} f(x)$ [d] $f(-3)$
 [e] $\lim_{x \rightarrow 2^-} f(x)$ [f] $\lim_{x \rightarrow 2^+} f(x)$
 [g] $\lim_{x \rightarrow 2} f(x)$ [h] $f(-2)$
 [i] $\lim_{x \rightarrow 1^-} f(x)$ [j] $\lim_{x \rightarrow 1^+} f(x)$
 [k] $\lim_{x \rightarrow -1} f(x)$ [l] $f(-1)$
 [m] $\lim_{x \rightarrow 2^-} f(x)$ [n] $\lim_{x \rightarrow 2^+} f(x)$
 [o] $\lim_{x \rightarrow 2} f(x)$ [p] $f(2)$

[8] Refer to the graph of $y = f(x)$ shown above. Use the three-way test for continuity to explain how you know that f is discontinuous at each of the following points:

- [a] -3 [b] -2 [c] -1 [d] 2 .

[9] Evaluate the limits based on the values given in the table. One or more limits may not exist.

	$x = 3.9$	$x = 3.99$	$x = 3.999$	$x = 4$	$x = 4.001$	$x = 4.01$	$x = 4.1$
$f(x)$	-1.9	-1.99	-1.999	-2	-2.999	-2.99	-2.9
$g(x)$	0.1	0.01	0.0001	dne	-0.0001	-0.01	-0.1
$h(x)$	4.98	4.998	4.9998	5	5.15	5.015	5.0015
$p(x)$	2	20	200	dne	-300	-30	-3

- [a] $\lim_{x \rightarrow 4} f(x)$ [b] $\lim_{x \rightarrow 4} g(x)$ [c] $\lim_{x \rightarrow 4} h(x)$ [d] $\lim_{x \rightarrow 4} p(x)$

[10] Refer to the table in the previous problem.

[a] List any functions with a jump discontinuity $x = 4$. _____

[b] List any functions with a removable discontinuity $x = 4$. _____

[11] The graph of $y = f(x)$ is given. Evaluate the following expressions.

- [a] $\lim_{x \rightarrow 3^-} f(x)$ [b] $\lim_{x \rightarrow 3^+} f(x)$
 [c] $\lim_{x \rightarrow 3} f(x)$ [d] $f(-3)$
 [e] $\lim_{x \rightarrow 1^-} f(x)$ [f] $\lim_{x \rightarrow 1^+} f(x)$
 [g] $\lim_{x \rightarrow 1} f(x)$ [h] $f(1)$
 [i] $\lim_{x \rightarrow 3^-} f(x)$ [j] $\lim_{x \rightarrow 3^+} f(x)$
 [k] $\lim_{x \rightarrow 3} f(x)$ [l] $f(3)$

