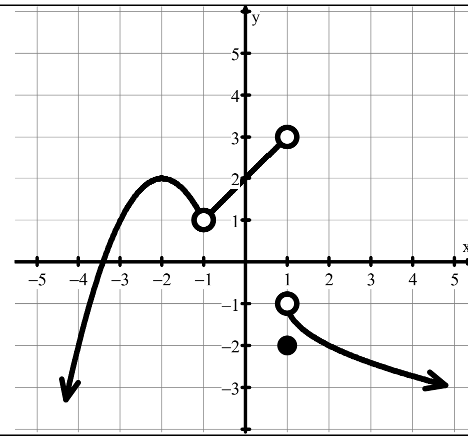
2.3 Application and Extension

1) Using the graph on the right, give the value of each statement.



a. $\lim\limits_{x\to 1^-} f(x) =$ 3

b. $f(-1) =$ dne

c. $\lim\limits_{x\to -1} f(x) =$ 1

d. $\lim\limits_{x\to -2} f(x) =$ 2

e. $f(1) =$ −2

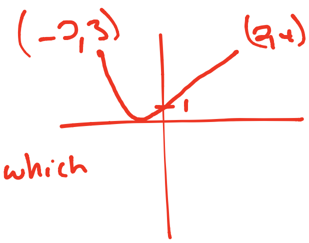
f. $\lim\limits_{x\to 1^+} f(x) =$ −1

2) A function f is continuous on $[-2, 2]$ and some of the values of f are shown to the right:

x	-2	0	2
$f(x)$	3	b	4

If f has only one root, r, on the closed interval $[-2, 2]$, and $r \neq 0$, then a possible value of b is

a) -3 b) -2 c) -1 d) 0 e) 1



Explain your reasoning in full sentences. (*Hint: Draw a picture!!*)

If b < 0, then the graph will cross the x-axis twice. Therefore b cant be −3, −2, −1. Also, if b=0, then r=0, which the problem says r≠0. By default, b=1

3) Sketch (freehand) a graph of a function f that satisfies all of the following conditions:

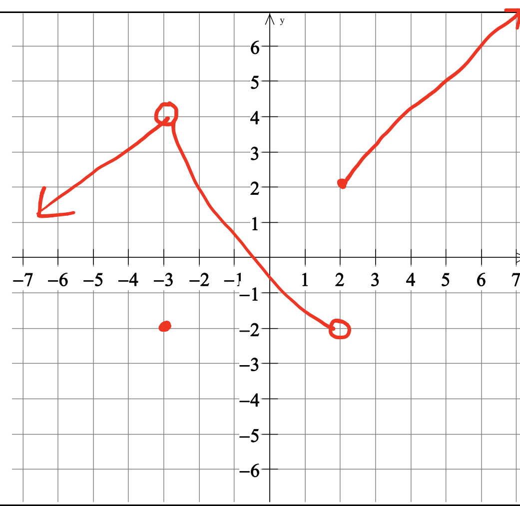
a. $\lim\limits_{x\to -3} f(x) = 4$

b. $\lim\limits_{x\to 5} f(x) = f(5)$

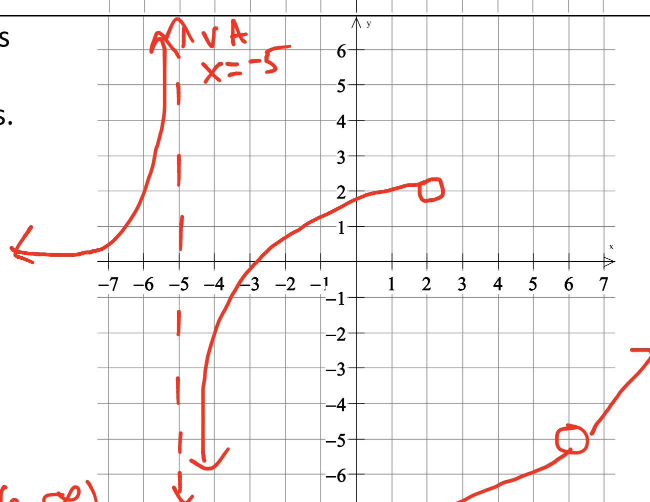
c. f is decreasing on $(-3, 2)$

d. $f(-3) = -2$

e. $\lim\limits_{x\to 2^-} f(x) < \lim\limits_{x\to 2^+} f(x)$



4) Sketch your own function with multiple discontinuities (nonremovable and removable). In the space below, describe your graph using limits for the discontinuities. Also share the intervals on which it is increasing and decreasing.



$\lim\limits_{x\to -5^-} f(x) = \infty$

$\lim\limits_{x\to -5^+} f(x) = -\infty$

$\lim\limits_{x\to 2^-} f(x) = 2$

$\lim\limits_{x\to 2^-} f(x) = -7$

$\lim\limits_{x\to 6^-} f(x) = -5$

$\lim\limits_{x\to 6^+} f(x) = -5$

$f(6) =$ dne

INC INT = $(-\infty,-5) \cup (-5,2) \cup (2,6) \cup (6,\infty)$

Dec INT = $\emptyset$