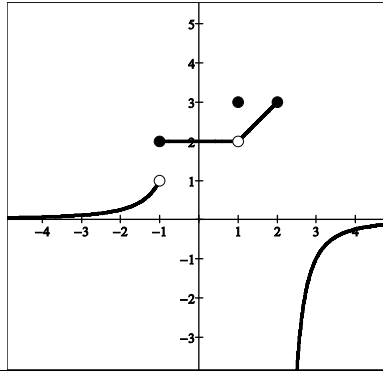
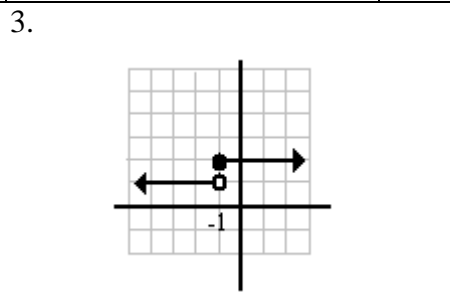


LIMITS WORKSHEET #4
SOLUTIONS SOLUTIONS SOLUTIONS SOLUTIONS SOLUTIONS

1.



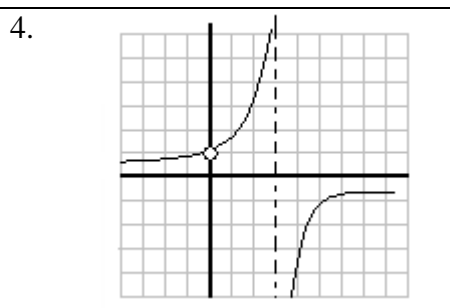
a) $\lim_{x \rightarrow -1^-} f(x) = \boxed{1}$	b) $\lim_{x \rightarrow -1^+} f(x) = \boxed{2}$	c) $\lim_{x \rightarrow -1} f(x) = \boxed{\text{DNE}}$	d) $\lim_{x \rightarrow 1^-} f(x) = \boxed{2}$
e) $\lim_{x \rightarrow 1^+} f(x) = \boxed{2}$	f) $\lim_{x \rightarrow 1} f(x) = \boxed{2}$	g) $\lim_{x \rightarrow 2^-} f(x) = \boxed{3}$	h) $\lim_{x \rightarrow 2^+} f(x) = \boxed{-\infty}$
i) $\lim_{x \rightarrow 2} f(x) = \boxed{\text{DNE}}$	j) $\lim_{x \rightarrow -3} f(x) = \boxed{\frac{1}{9}}$	k) $\lim_{x \rightarrow 5} f(x) = \boxed{\frac{-1}{9}}$	l) $\lim_{x \rightarrow 1.5} f(x) = \boxed{\frac{5}{2}}$



3a) Is $f(x)$ continuous at $x = -1$?
 $\boxed{\text{No, because } \lim_{x \rightarrow -1} f(x) \text{ DNE}}$

3b) What kind(s) of discontinuity does $f(x)$ have?
 $\boxed{\text{Jump Discontinuity}}$

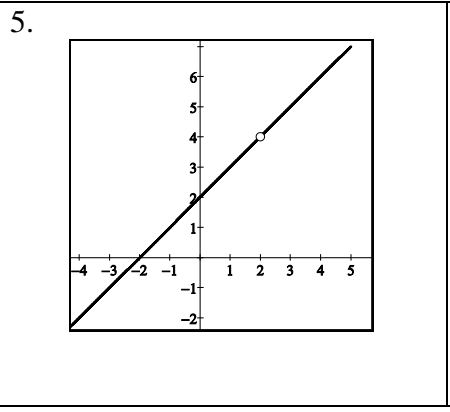
3c) On what open interval(s) is $f(x)$ continuous?
 $\boxed{(-\infty, -1) \cup (-1, \infty)}$



4a) Is $f(x)$ continuous at $x = 3$?
 $\boxed{\text{No, because } f(3) \text{ DNE}}$

4b) What kind(s) of discontinuity does $f(x)$ have?
 $\boxed{\text{Point and Infinite Discontinuity}}$

4c) On what open interval(s) is $f(x)$ continuous?
 $\boxed{(-\infty, 0), (0, 3), (3, \infty)}$

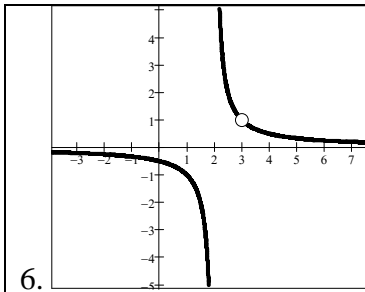


5a) Is $f(x)$ continuous at $x = 2$?
 $\boxed{\text{No, because } f(2) \text{ DNE}}$

5b) What kind(s) of discontinuity does $f(x)$ have?
 $\boxed{\text{Point Discontinuity}}$

5c) On what open interval(s) is $f(x)$ continuous?
 $\boxed{(-\infty, 2) \cup (2, \infty)}$

5d) How would you remove the discontinuity?
 $\boxed{\text{Let } f(2) = 4}$



6.

6a) Is $f(x)$ continuous at $x=3$?

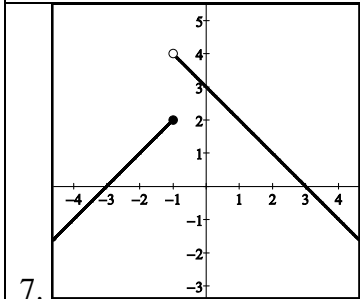
No, because $f(3)$ DNE

6b) What kind(s) of discontinuity does $f(x)$ have?

Point and Infinite Discontinuity

6c) On what open interval(s) is $f(x)$ continuous?

$(-\infty, 2)(2, 3)(3, \infty)$



7.

7a) Is $f(x)$ continuous at $x=-1$?

No, because $\lim_{x \rightarrow -1} f(x)$ DNE

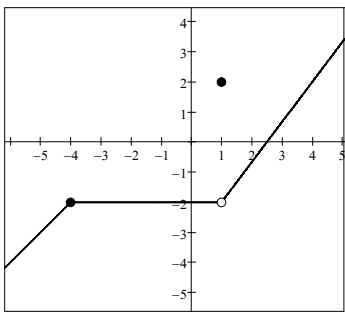
7b) What kind(s) of discontinuity does $f(x)$ have?

Jump Discontinuity

7c) On what open interval(s) is $f(x)$ continuous?

$(-\infty, -1)(-1, \infty)$

8.



8a) Is $f(x)$ continuous at $x=1$?

No, because $f(1) \neq \lim_{x \rightarrow 1} f(x)$ [$2 \neq -2$]

8b) What kind(s) of discontinuity does $f(x)$ have?

Point Discontinuity

8c) On what open interval(s) is $f(x)$ continuous?

$(-\infty, 1)(1, \infty)$

8d) Define $f(x)$ as a piecewise function. See Below

$$(1, -2)(4, 2) \Rightarrow m = \frac{2 - (-2)}{4 - 1} = \frac{4}{3} \Rightarrow y - y_1 = m(x - x_1) \Rightarrow y - 2 = \frac{4}{3}(x - 4) \Rightarrow y = \frac{4}{3}x - \frac{10}{3} \Rightarrow$$

$$f(x) = \begin{cases} x+2 & x \leq -4 \\ -2 & -4 < x < 1 \\ 2 & x = 1 \\ \frac{4}{3}x - \frac{10}{3} & x > 1 \end{cases}$$

Find each one-sided limit:

9. $\lim_{x \rightarrow 2^+} \frac{x-3}{x-2} = \boxed{-\infty}$

10. $\lim_{x \rightarrow 0^-} \frac{|x|}{x} = \boxed{-1}$

11. $\lim_{x \rightarrow 3^+} \frac{x-5}{x^2-9} = \boxed{-\infty}$

12. $\lim_{x \rightarrow \pi^-} \frac{\cos x}{x} =$
 $\frac{\cos \pi}{\pi} = \boxed{\frac{-1}{\pi}}$

13. $\lim_{x \rightarrow 3^-} \frac{x^2 + 2x - 3}{x^2 + x - 6} =$
 $\frac{9 + 2(3) - 3}{9 + (3) - 6} = \boxed{2}$

