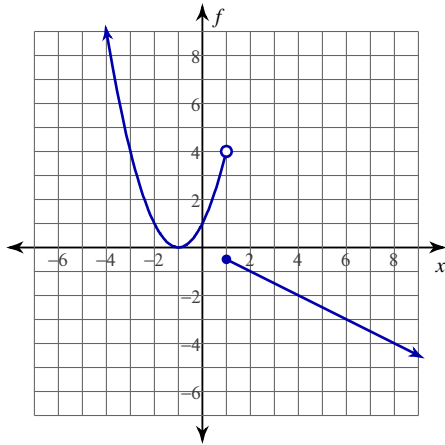


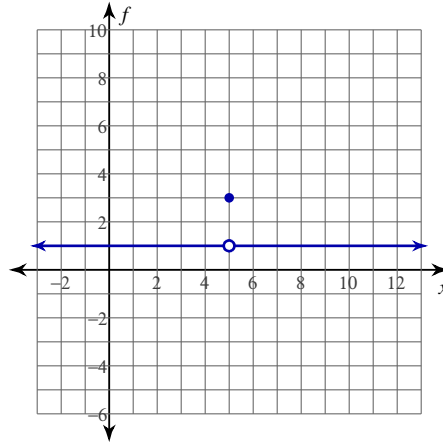
Continuity

Find the intervals on which each function is continuous.

$$1) f(x) = \begin{cases} x^2 + 2x + 1, & x < 1 \\ -\frac{x}{2}, & x \geq 1 \end{cases}$$

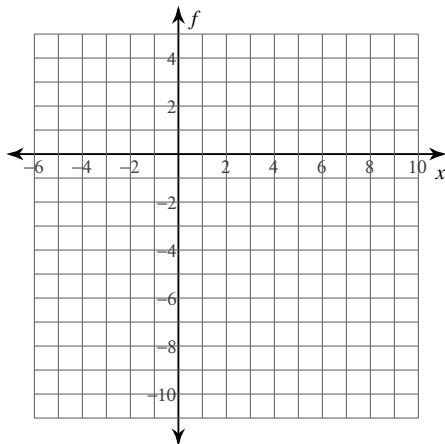


$$2) f(x) = \begin{cases} 1, & x \neq 5 \\ 3, & x = 5 \end{cases}$$

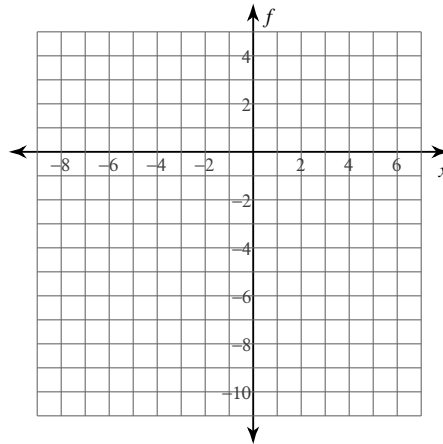


Find the intervals on which each function is continuous. You may use the provided graph to sketch the function.

$$3) f(x) = \begin{cases} 2x - 10, & x < 2 \\ 0, & x \geq 2 \end{cases}$$



$$4) f(x) = \frac{x^2 - x - 2}{x + 1}$$



Find the intervals on which each function is continuous.

$$5) f(x) = \frac{x^2}{2x+4}$$

$$6) f(x) = \begin{cases} -\frac{x}{2} - \frac{7}{2}, & x \leq 0 \\ -x^2 + 2x - 2, & x > 0 \end{cases}$$

$$7) f(x) = -\frac{x^2 - x - 12}{x+3}$$

$$8) f(x) = \frac{x^2 - x - 6}{x+2}$$

Determine if each function is continuous. If the function is not continuous, find the x -axis location of and classify each discontinuity.

$$9) f(x) = -\frac{x^2}{2x+4}$$

$$10) f(x) = \frac{x+1}{x^2 - x - 2}$$

$$11) f(x) = \frac{x+1}{x^2 + x + 1}$$

$$12) f(x) = -\frac{x^2}{x-1}$$

$$13) f(x) = \begin{cases} x^2 - 4x + 3, & x \neq 0 \\ 3, & x = 0 \end{cases}$$

$$14) f(x) = \begin{cases} -x^2, & x \neq 1 \\ 0, & x = 1 \end{cases}$$

Critical thinking questions:

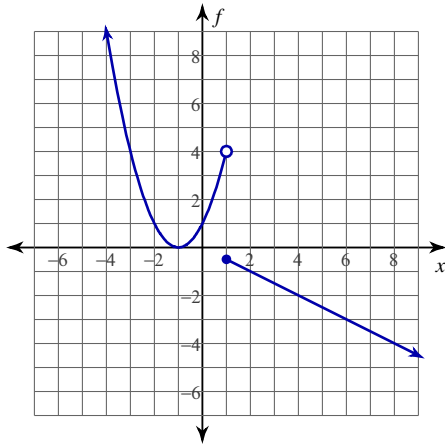
15) Give an example of a function with discontinuities at $x = 1, 2,$ and $3.$

16) Of the six basic trigonometric functions, which are continuous over all real numbers? Which are not? What types of discontinuities are there?

Continuity

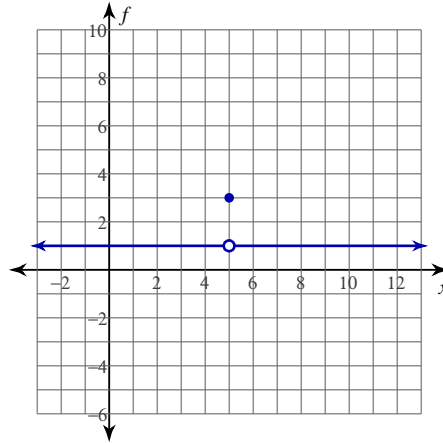
Find the intervals on which each function is continuous.

$$1) f(x) = \begin{cases} x^2 + 2x + 1, & x < 1 \\ -\frac{x}{2}, & x \geq 1 \end{cases}$$



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

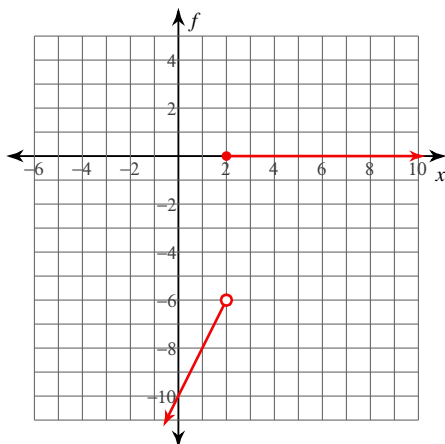
$$2) f(x) = \begin{cases} 1, & x \neq 5 \\ 3, & x = 5 \end{cases}$$



$(-\infty, 5), (5, \infty)$

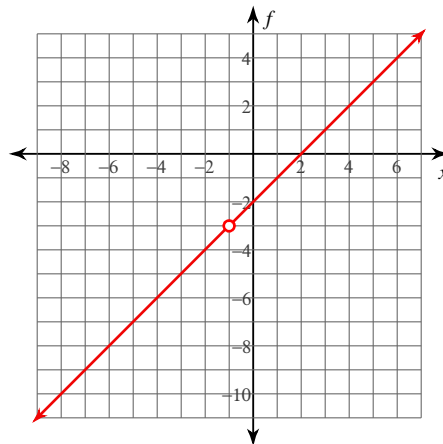
Find the intervals on which each function is continuous. You may use the provided graph to sketch the function.

$$3) f(x) = \begin{cases} 2x - 10, & x < 2 \\ 0, & x \geq 2 \end{cases}$$



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

$$4) f(x) = \frac{x^2 - x - 2}{x + 1}$$



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

Find the intervals on which each function is continuous.

$$5) f(x) = \frac{x^2}{2x+4}$$

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

$$6) f(x) = \begin{cases} -\frac{x}{2} - \frac{7}{2}, & x \leq 0 \\ -x^2 + 2x - 2, & x > 0 \end{cases}$$

$(-\infty, 0], (0, \infty)$

$$7) f(x) = -\frac{x^2 - x - 12}{x+3}$$

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

$$8) f(x) = \frac{x^2 - x - 6}{x+2}$$

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

Determine if each function is continuous. If the function is not continuous, find the x -axis location of and classify each discontinuity.

$$9) f(x) = -\frac{x^2}{2x+4}$$

Essential discontinuity at: $x = -2$

$$10) f(x) = \frac{x+1}{x^2 - x - 2}$$

Removable discontinuity at: $x = -1$
Essential discontinuity at: $x = 2$

$$11) f(x) = \frac{x+1}{x^2 + x + 1}$$

Continuous

$$12) f(x) = -\frac{x^2}{x-1}$$

Essential discontinuity at: $x = 1$

$$13) f(x) = \begin{cases} x^2 - 4x + 3, & x \neq 0 \\ 3, & x = 0 \end{cases}$$

Continuous

$$14) f(x) = \begin{cases} -x^2, & x \neq 1 \\ 0, & x = 1 \end{cases}$$

Removable discontinuity at: $x = 1$

Critical thinking questions:

15) Give an example of a function with discontinuities at $x = 1, 2,$ and 3 .

Many answers. $\frac{1}{(x-1)(x-2)(x-3)}$

16) Of the six basic trigonometric functions, which are continuous over all real numbers? Which are not? What types of discontinuities are there?

Cont: sin, cos. Not cont: sec, csc, tan, cot. Essential.