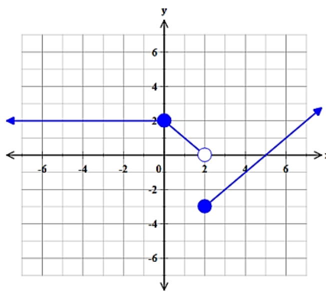
NOTES: SECONDARY 2 HONORS
PIECEWISE FUNCTIONS, STEP FUNCTIONS, AND ABSOLUTE VALUE FUNCTIONS (2.12)

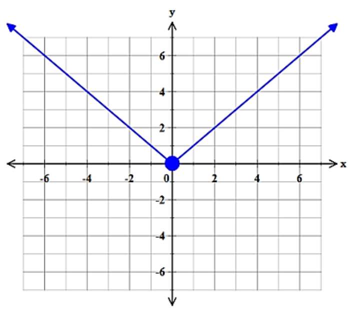
Vocabulary

- A **piecewise-defined function** is a function that consists of

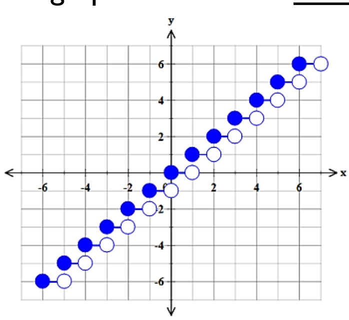


This function consists of pieces of three lines.

- An **absolute value function** is *f(x)*=|*x*|. The graph of every absolute value function always has a _______ shape.



- **Step functions** are piecewise-defined functions made up of constant functions. It is called a step function because the graph resembles a ___________________

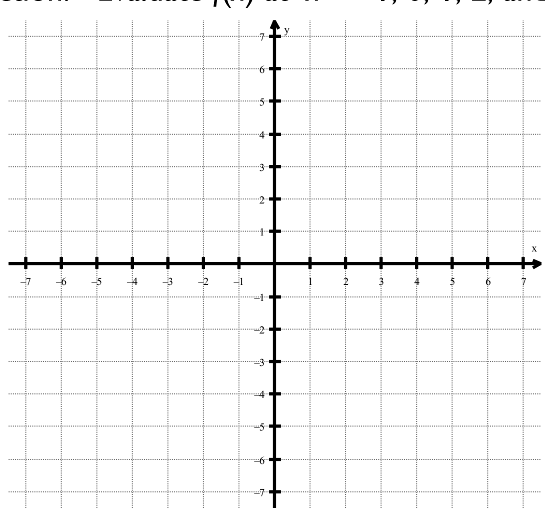


The step function is written $y = \|x\|$. *This greatest integer less than or equal to a number.*

int(0.0001) = 0
int(0.5) = 0
int(0.99999) = 0
int(1) = 1

Example #1: Consider the piecewise-defined function. Evaluate *f*(*x*) at *x* = −1, 0, 1, 2, and 3. Sketch the graph of the piecewise function *f*.

$$f(x) = \begin{cases} -3 & x < 0 \\ 1 & 0 \le x < 2 \\ 3 & x \ge 2 \end{cases}$$



f(-1) =

f(0) =

f(-1) =

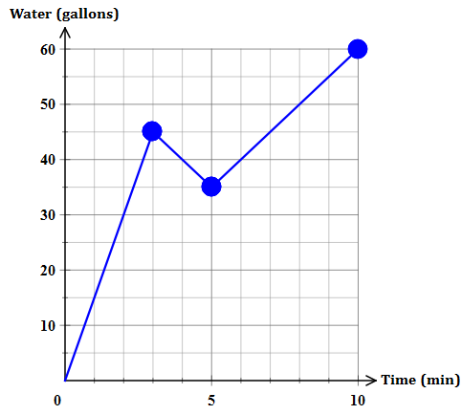
f(2) =

f(3) =

Example #2 Bathtub problem

The piecewise function G(t) represents the number of gallons of water in a bathtub.

$$G(t)=\begin{cases} 15x & 0\le t<3 \\ -5x+60 & 3\le t<5 \\ 5x+10 & 5\le t\le 10 \end{cases}$$



a. What does G(3) represent?

b. What does G(5) represent?

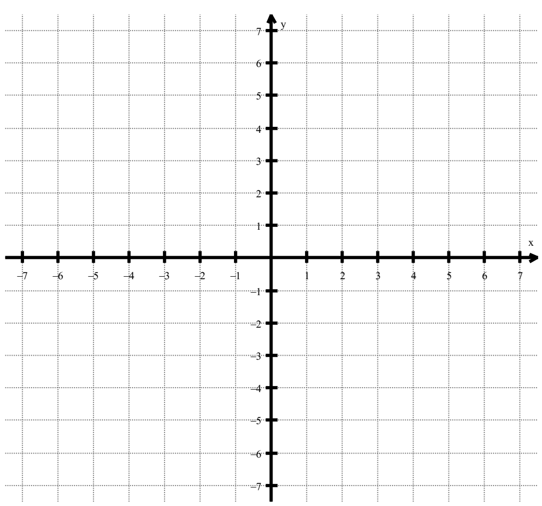
c. During what time period is the amount of water increasing?

d. During what time period is the amount of water decreasing?

e. Identify the maximum of G(t) and explain its meaning.

Example #3: Graph the piecewise-defined function and identify the key features.

$$f(x)=\begin{cases} x+2 & x<-2 \\ 1 & -2\le x<0 \\ -2x+6 & x\ge 0 \end{cases}$$



x-intercept(s):

y-intercept:

max/min:

increasing interval(s):

decreasing interval(s):

constant interval(s):

positive interval(s):

negative interval(s):

left end behavior: as $x\to -\infty$, $y\to$

right end behavior: as $x\to\infty$, $y\to$