E.g. Given that:

$$C(t) = \begin{cases} 20 & \text{if } 0 \le t \le 60 \\ 20 + 0.4\cdot(t-60) & \text{if } 60 < t < 1000 \\ 20000 & \text{if } t \ge 1000 \end{cases}$$

Evaluate $C(40) = 20$

$C(70) = 20 + 0.4(70-60)$

$= 20 + (0.4)\cdot 10 = 24$

$C(1001) = 20000$

E.g. Graph a piecewise function.

$$f(x) = \begin{cases} 3 & \text{if } x \le -1 \\ x-2 & \text{if } x > -1 \end{cases}$$

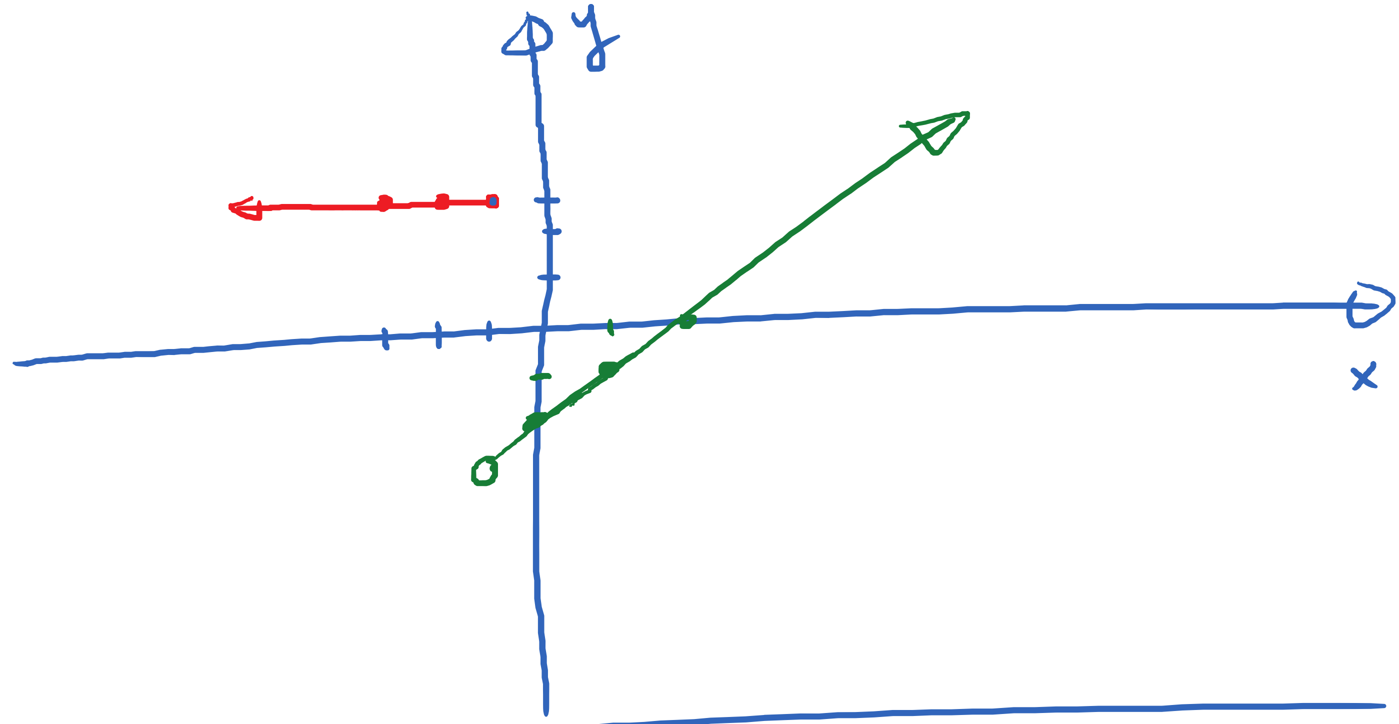
Graph the pieces of the function

x	$f(x) = 3$	
-1	3	$\to (-1,3)$
-2	3	$\to (-2,3)$
-3	3	$\to (-3,3)$

x	$f(x) = x-2$	
0	-2	$\to (0,-2)$
1	-1	$\to (1,-1)$
2	0	$\to (2,0)$

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

1	-1	$\rightarrow (1, -1)$
2	0	$\rightarrow (2, 0)$



Objective #4: Find and simplify the difference quotient of a function.

The expression: $\boxed{\dfrac{f(x+h)-f(x)}{h}}$, $h \neq 0$

is called the difference quotient of the function f.

E.g. $f(x) = 2x$. Find and simplify the difference quotient of f.

$f(x+h) = 2(x+h)$; $f(x) = 2x$

$$\frac{f(x+h)-f(x)}{h} = \frac{2(x+h) - 2x}{h}$$

$$= \frac{\cancel{2x}+2h \cancel{-2x}}{h}$$

$$= \frac{2h}{h} = \boxed{2.}$$

E.g. $f(x) = x^2 - 4x + 3$.

Find and simplify the difference quotient for f.

$$f(x+h) = (x+h)^2 - 4(x+h) + 3$$

$$= x^2 + 2xh + h^2 - 4x - 4h + 3$$

$$f(x) = x^2 - 4x + 3$$

$$\frac{f(x+h)-f(x)}{h} = \frac{x^2+2xh+h^2-4x-4h+3-(x^2-4x+3)}{h}$$

$$= \frac{\cancel{x^2}+2xh+h^2\cancel{-4x}-4h\cancel{+3}\cancel{-x^2}\cancel{+4x}\cancel{-3}}{h}$$

$$= \frac{2xh + h^2 - 4h}{h} = \frac{\cancel{h}(2x + h - 4)}{\cancel{h}}$$

$$= \boxed{2x + h - 4}$$