1 *Let f be the function such that*

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

for every possible real number x. Evaluate or simplify the following. (Show at least one intermediate step for each.)

a $f(-1)$

I replace x with -1 (in parentheses) and evaluate:

$$\begin{aligned} f(x) &= 3x^2 + 2x - 4; \\ f(-1) &= 3(-1)^2 + 2(-1) - 4 = -3. \end{aligned}$$

b $f(x+1)$

I replace x with $x+1$ (in parentheses) and simplify:

$$\begin{aligned} f(x) &= 3x^2 + 2x - 4; \\ f(x+1) &= 3(x+1)^2 + 2(x+1) - 4 = 3x^2 + 8x + 1. \end{aligned}$$

2 *Let h be the function such that*

$$h(x) = \sqrt{3x - 12}$$

for every possible real number x. What is the domain of h? (Show at least one intermediate step.)

I can't take a real square root of a negative number, so

$$\begin{aligned} 3x - 12 &\geq 0, \\ 3x &\geq 12, \\ x &\geq 4. \end{aligned}$$

Therefore, the domain is

$$\{x \mid x \geq 4\} = [4, \infty).$$

3 *Let f be the function whose graph is shown on the screen.*

a *What is $f(6)$?*

Since $(6, 0)$ is on the graph,

$$f(6) = 0.$$

b *Solve the equation $f(x) = -2$.*

Since $(-5, -2)$ and $(8, -2)$ are on the graph but no other example of $(x, -2)$ is on the graph,

$$x = -5 \text{ or } x = 8.$$