

For the function $f(x) = x^2 - x$, answer each of the questions.

- a. Find the value of $f(2)$.

Solution To find $f(2)$, we need to replace the x in the formula with 2,

$$\begin{aligned} f(2) &= 2^2 - 2 \\ &= 4 - 2 \\ &= 2 \end{aligned}$$

- b. Find $f\left(\frac{1}{z}\right)$.

Solution Although the input is not a number, we still evaluate the function by replacing the x with the input. In this case, we replace x with $\frac{1}{z}$:

$$\begin{aligned} f\left(\frac{1}{z}\right) &= \left(\frac{1}{z}\right)^2 - \frac{1}{z} \\ &= \frac{1}{z^2} - \frac{1}{z} \end{aligned}$$

- c. Find all values of x for which $f(x) = 6$.

Solution Instead of supplying the input to the function, the output is supplied instead. To solve this part, set the formula equal to 6 and solve for x .

$x^2 - x = 6$	Set function equal to 6
$x^2 - x - 6 = 0$	Put all terms on one side to solve a quadratic equation.
$(x-3)(x+2) = 0$	Factor
$x-3 = 0 \quad x+2 = 0$	Set each factor equal to 0
$x = 3 \quad x = -2$	Solve each equation for x

We can check that these values are correct by putting them into the function:

$$\begin{aligned} f(3) &= 3^2 - 3 = 6 \\ f(-2) &= (-2)^2 - (-2) = 6 \end{aligned}$$

- d. Find $f(x+h)$.

Solution Replace x with $x+h$ in the function,

$$\begin{aligned}f(x+h) &= (x+h)^2 - (x+h) \\ &= x^2 + 2xh + h^2 - x - h\end{aligned}$$

The output has been simplified by noting that $(x+h)^2$ is multiplied by FOILing:

$$(x+h)(x+h) = x^2 + 2xh + h^2$$