

Exercise 3

For the following exercises, use long division to divide. Specify the quotient and the remainder.

$$(x^2 + 5x - 1) \div (x - 1)$$

Solution

Set up the division problem, writing out every term in the dividend.

$$x - 1 \overline{) x^2 + 5x - 1}$$

Divide the leading term of the dividend by the leading term of the divisor and place the result above the term with the same power of x .

$$x - 1 \overline{) x^2 + 5x - 1} \quad \begin{array}{r} x \\ \end{array}$$

Multiply this result by the divisor and subtract it from the dividend.

$$\begin{array}{r} x - 1 \overline{) x^2 + 5x - 1} \\ \underline{-(x^2 - x)} \\ 6x \end{array}$$

Bring the next term in the dividend down.

$$\begin{array}{r} x \\ x-1 \overline{) x^2 + 5x - 1} \\ \underline{-(x^2 - x)} \quad \downarrow \\ 6x - 1 \end{array}$$

Divide the leading term of this modified dividend by the leading term of the divisor and place the result above the term with the same power of x .

$$\begin{array}{r} x+6 \\ x-1 \overline{) x^2 + 5x - 1} \\ \underline{-(x^2 - x)} \\ 6x - 1 \end{array}$$

Multiply this result by the divisor and subtract it from the modified dividend.

$$\begin{array}{r} x+6 \\ x-1 \overline{) x^2 + 5x - 1} \\ \underline{-(x^2 - x)} \\ 6x - 1 \\ \underline{-(6x - 6)} \\ 5 \end{array}$$

There are no further terms in the dividend to drop down, so the division is complete. The quotient is $x + 6$, and the remainder is 5.

$$(x^2 + 5x - 1) \div (x - 1) = x + 6 + \frac{5}{x - 1}$$