Example 1

Is $x = 1$ and $y = 2$ a solution for the equation $x^2 + y = 2xy$?

What about $x = 1$ and $y = 1$?

Example 2

Suppose a fuel mixture is 4% ethanol and 96% gasoline. How much ethanol (in gallons) must you add to one gallon of fuel so that the new fuel mixture is 10% ethanol?

Example 3

Solve the equation $x^3 + 2xy + 5y = 7$ for y in terms of x.

Example 4

Find the domain of the following functions:

$$f(x) = \sqrt{3 - x} \qquad g(x) = \frac{1}{x^2 - 4} \qquad h(x) = \frac{1}{x} + \sqrt{x + 2}$$

Example 5

If $f(x) = \sqrt{6x + 4}$, write an expression for:

$$\Big[f(1 + h) - f(1)\Big] \cdot \Big[f(1 + h) + f(1)\Big]$$

Example 6

If $P(x) = 3x^3 + 2x^2 + x + 11$ and we rewrite $P(x)$ in the form

$$P(x) = A + B(x-1) + C(x-1)(x-2) + D(x-1)(x-2)(x-3),$$

what are the values of A and B?

Example 7

If we rewrite the function $f(x) = \dfrac{3}{x(x-1)(x-2)}$ in the form:

$$f(x) = \frac{A}{x} + \frac{B}{x-1} + \frac{C}{x-2},$$

what are the values of A, B, and C?

Example 8

If $h(t) = 3t + 7$, find a function $g(t)$ such that $h(g(t)) = t$.

Example 9

If the equation of the line through the points $(3, 4)$ and $(-1, 6)$ is written as

$$y = A + B(x + 1),$$

what are the values of A and B?

Example 10

The parabola $y = x^2 - 15x + 54$ intersects the x-axis at the two points P and Q. What is the distance from P to Q?

If we rewrite the inequality $x^2 - 15x + 54 < 0$ in the form $A < x < B$, what are the values of A and B?

Example 11

Find the point(s) of intersection between the graph of the equation $4x^2 + 9y^2 = 36$ and the line with equation

- $y = -2$;

- $y = 1$.

Example 12

Find all points where the graph of $(y-1)^2 - 2 = x$ crosses

- the y-axis;

- the x-axis.

Example 13

The area of a right triangle is 7. The sum of the lengths of the two sides adjacent to the right angle of the triangle is 11. What is the length of the hypotenuse of the triangle?

Example 14

What is the smallest root of the polynomial $Q(x) = x^3 - 12x^2 + 44x - 48$?