

Manipulations.

Find x given $x = \text{input}$
 $y = 2x + 1$ $y = \text{output}$

$$\begin{aligned} 2x + 1 &= y \\ 2x &= y - 1 \end{aligned}$$

$$\frac{1}{y} = \frac{1}{x} + \frac{1}{z}$$

$$\frac{xz}{xz} = \frac{yz + xz}{xz}$$

$$xz - xz = yz - xz$$

$$x(z - y) = yz$$

$$x = \frac{yz}{z - y}$$

$$y = x^2 - 4x - 5$$

$$(x + 1)^2 = x^2 + 2x + 1$$

$$(x + 5)^2 = x^2 + 10x + 25$$

$$(x+6)^2 = x^2 + 12x + 36$$

$$(x+7)^2 = x^2 + 14x + 49$$

$$(x+10)^2 = x^2 + 20x + 100$$

$$y = x^2 - 4x - 5$$

$$y = x^2 - 4x + 4 - 5 - 4$$

$$y = (x-2)^2 - 9$$

$$y+9 = (x-2)^2$$

$$\sqrt{y+9} = x-2$$

$$\sqrt{y+9} + 2 = x$$

Given $\frac{3}{a} + \frac{5}{b} = c$ write
b in terms of a and c.

$$\frac{3}{a} + \frac{5}{b} = c$$

$$\frac{3b + 5a = abc}{ab}$$

$$3b - abc = -5a$$

$$b(3-ac) = -5a$$

$$b = \frac{-5a}{3-ac}$$

$$= \frac{5a}{ac-3}$$

Given $\frac{5}{x} + \frac{3}{y} = \frac{2}{t}$ write
 y in terms of x and t

$$\frac{5}{x} + \frac{3}{y} = \frac{2}{t}$$

$$3xt = 2xy - 5yt \quad \frac{5yt + 3xt = 2xy}{xyt}$$

$$5yt - 2xy = -3xt$$

$$(5t - 2x)y = -3xt$$

$$y = \frac{-3xt}{5t - 2x}$$

$$= \frac{3xt}{2x - 5t}$$

Given $t = p\sqrt{\frac{1}{q}}$ write
 q in terms of t and p .

$$t = p\sqrt{\frac{1}{q}}$$

$$t^2 = p^2\left(\frac{1}{q}\right)$$

$$qt^2 = p^2$$

$$q = \frac{p^2}{t^2}$$

Given
write

$y = t + 5$ and $t = x + 3$
in terms of x .

$$y = t + 5$$

$$t = x + 3$$

$$y = x + 3 + 5$$

$$y = x + 8$$

Substitution.

Given $(x+p)^2 + q = x^2 + 6x + 12$
find p and q .

$$x^2 + 2px + p^2 + q = x^2 + 6x + 12$$

$$2p = 6$$

$$p = 3$$

$$p^2 + q = 12$$

$$9 + q = 12$$

$$q = 3$$

$$(x+5)^2 = x^2 + 10x + 25$$

$$(x+3)^2 + 6 = x^2 + 6x + 9 + 6$$

$$(x+3)(x+3) + 6 = x^2 + 6x + 15$$
$$x^2 + 3x + 3x + 9 + 6$$

$$(x+p)(x^2 - 2x + 3) = x^3 + qx^2 + rx + 9$$

$$x^3 - 2x^2 + 3x + px^2 - 2px + 3p = x^3 + qx^2 + rx + 9$$

$$-2 + p = q$$

$$-2 + 3 = q \Rightarrow q = 1$$

$$3 - 2p = r$$

$$3p = 9$$

$$p = 3$$