PT Solving some simple (linear) equations

The basic form of a linear equation is something like this

$$5x - 7 = 9 + x$$
$$-x \qquad\quad -x$$

$$4x - 7 = 9$$
$$+7 \quad +7$$

$$\frac{1}{4} \cdot 4x = 16 \cdot \frac{1}{4}$$

$$x = 4$$

Sometimes more complicated looking equations reduce (or simplify) to linear equations.

example $x^2+3x-9 = x^2+x+5$

$-x^2 \qquad -x^2$

$3x-9 = x+5$ linear

$-x \quad -x$

$2x-9 = 5$

$+9 \quad +9$

$\frac{1}{2}\cdot \quad 2x = 14 \quad \cdot\frac{1}{2}$

$\boxed{x=7}$

example $\frac{1}{x} - \frac{1}{x(x+1)} = \frac{1}{3x}$

Least common denominator for all these fractions is $3x(x+1)$

$$3x(x+1)\left(\frac{1}{x} - \frac{1}{x(x+1)}\right) = \frac{1}{3x}\,3x(x+1)$$

$$\frac{3x(x+1)}{x} - \frac{3x(x+1)}{x(x+1)} = \frac{3x(x+1)}{3x}$$

$$3(x+1) - 3 = x+1$$

$$3x + 3 - 3 = x + 1$$

$$3x = x + 1$$

$$-x \quad -x$$

$$\frac{1}{2} \cdot 2x = 1 \cdot \frac{1}{2}$$

$$\boxed{x = \frac{1}{2}}$$