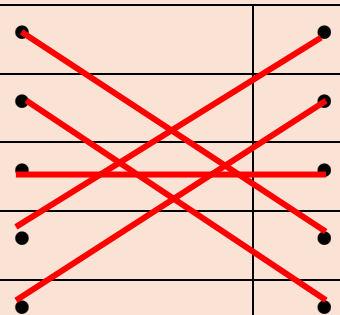
Exercice 2.1.1

On propose ci-dessous 5 équations sous leur forme développée (colonne de gauche) et factorisée (colonne de droite). Relie les paires correspondantes :

$x^2 - 16x = 0$		$x(4x - 5) = 0$
$3x^2 - 5x + 2 = 0$		$(x + 2)(x - 2) = 0$
$x^2 + 19x + 18 = 0$		$(x + 18)(x + 1) = 0$
$4x^2 = 5x$		$x(x - 16) = 0$
$x^2 = 4$		$(3x - 2)(x - 1) = 0$

Exercice 2.1.2

Factorise les équations suivantes et détermine l'ensemble des solutions sachant par mise en évidence du facteur x.

a) $x^2 = 9x$

$x^2 - 9x = 0$

$x(x - 9) = 0$

$x = 0 \Rightarrow x_1 = 0$

$x - 9 = 0 \Rightarrow x_2 = 9$ $\qquad S = \{0 ; 9\}$

b) $4x^2 = 5x$

$4x^2 - 5x = 0$

$x(4x - 5) = 0$

$x = 0 \Rightarrow x_1 = 0$

$4x - 5 = 0 \Rightarrow x_2 = \frac{5}{4}$ $\qquad S = \{0 ; \frac{5}{4}\}$

c) $5x^2 + 25x = 0$

$5x(x + 5) = 0$

$5x = 0 \Rightarrow x_1 = 0$

$x + 5 = 0 \Rightarrow x_2 = -5$ $\qquad S = \{-5 ; 0\}$

d) $15x^2 + 3x + 12 = 12$

$15x^2 + 3x = 0$

$3x(5x + 1) = 0$

$3x = 0 \Rightarrow x_1 = 0$

$5x + 1 = 0 \Rightarrow x_2 = -\frac{1}{5}$ $\qquad S = \{-\frac{1}{5} ; 0\}$

Exercice 2.1.3

Factorise les équations suivantes et détermine l'ensemble des solutions sachant que P(x) est une identité remarquable.

a) $9x^2 + 30x + 25 = 0$

$(3x + 5)^2 = 0$

$3x + 5 = 0 \Rightarrow x = -\frac{5}{3}$ $\qquad S = \{-\frac{5}{3}\}$

b) $49x^2 - 42x + 9 = 0$

$(7x - 3)^2 = 0$

$7x - 3 = 0 \Rightarrow x = \frac{3}{7}$ $\qquad S = \{\frac{3}{7}\}$

c) $100x^2 + 200x + 100 = 0$

$(10x + 10)^2 = 0$

$10x + 10 = 0 \Rightarrow x = -1$ $\qquad S = \{-1\}$

d) $16x^2 - 48x + 36 = 0$

$(4x - 6)^2 = 0$

$4x - 6 = 0 \Rightarrow x = \frac{6}{4} = \frac{3}{2}$ $\qquad S = \{\frac{3}{2}\}$

e) $49x^2 - 16 = 0$

$(7x + 4)(7x - 4) = 0$

$7x + 4 = 0 \quad \Rightarrow x_1 = -\frac{4}{7} \qquad 7x - 4 = 0 \quad \Rightarrow x_2 = \frac{4}{7}$ $\qquad S = \{-\frac{4}{7}; \frac{4}{7}\}$

f) $81x^2 + 18x + 1 = 0$

$(9x + 1)^2 = 0$

$9x + 1 = 0 \Rightarrow x = -\frac{1}{9}$ $\qquad S = \{-\frac{1}{9}\}$

Exercice 2.1.4

Factorise les équations suivantes et détermine l'ensemble des solutions sachant que P(x) est une identité remarquable.

a) $36x^2 + 60x + 25 = 0$

$(6x + 5)^2 = 0$

$6x + 5 = 0 \Rightarrow x = -\frac{5}{6}$ $\quad S = \{-\frac{5}{6}\}$

b) $64x^2 + 96x + 36 = 0$

$(8x + 6)^2 = 0$

$8x + 6 = 0 \Rightarrow x = -\frac{6}{8} = -\frac{3}{4}$ $\quad S = \{-\frac{3}{4}\}$

c) $25x^2 - 16 = 0$

$(5x + 4)(5x - 4) = 0$

$5x + 4 = 0 \Rightarrow x_1 = -\frac{4}{5}$ $\quad 5x - 4 = 0 \Rightarrow x_2 = \frac{4}{5}$ $\quad S = \{-\frac{4}{5}; \frac{4}{5}\}$

d) $36x^2 - 48x + 16 = 0$

$(6x - 4)^2 = 0$

$6x - 4 = 0 \Rightarrow x = \frac{4}{6} = \frac{2}{3}$ $\quad S = \{\frac{2}{3}\}$

e) $36x^2 - 60x + 25 = 0$

$(6x - 5)^2 = 0$

$6x - 5 = 0 \Rightarrow x = \frac{5}{6}$ $\quad S = \{\frac{5}{6}\}$

Exercice 2.1.5

Factorise les équations suivantes et détermine l'ensemble des solutions sachant que P(x) est une identité remarquable.

a) $64x^2 - 16x + 1 = 0$

$(8x - 1)^2 = 0$

$8x - 1 = 0 \Rightarrow x = \frac{1}{8}$ $S = \{\frac{1}{8}\}$

b) $4x^2 - 16 = 0$

$(2x + 4)(2x - 4) = 0$

$2x + 4 = 0 \Rightarrow x_1 = -\frac{4}{2} = -2$ $2x - 4 = 0 \Rightarrow x_2 = \frac{4}{2} = 2$ $S = \{-2 ; 2\}$

c) $9x^2 + 30x + 25 = 0$

$(3x + 5)^2 = 0$

$3x + 5 = 0 \Rightarrow x = -\frac{5}{3}$ $S = \{-\frac{5}{3}\}$

d) $49x^2 - 112x + 64 = 0$

$(7x - 8)^2 = 0$

$7x - 8 = 0 \Rightarrow x = \frac{8}{7}$ $S = \{\frac{8}{7}\}$

e) $16x^2 - 40x + 25 = 0$

$(4x - 5)^2 = 0$

$4x - 5 = 0 \Rightarrow x = \frac{5}{4}$ $S = \{\frac{5}{4}\}$

f) $36x^2 - 25 = 0$

$(6x + 5)(6x - 5) = 0$

$6x + 5 = 0 \Rightarrow x_1 = -\frac{5}{6}$ $6x - 5 = 0 \Rightarrow x_2 = \frac{5}{6}$ $S = \{-\frac{5}{6} ; \frac{5}{6}\}$

g) $25x^2 - 50x + 25 = 0$

$(5x - 5)^2 = 0$

$5x - 5 = 0 \Rightarrow x = \frac{5}{5} = 1$ $S = \{1\}$

Exercice 2.1.6

Factorise les équations suivantes et détermine l'ensemble des solutions (trinôme) :

a) $x^2 + x - 56 = 0$

$(x + 8)(x - 7) = 0$

$x + 8 = 0 \Rightarrow x_1 = -8 \quad x - 7 = 0 \Rightarrow x_2 = 7$ $\quad S = \{-8 ; 7\}$

b) $x^2 + 11x = -30$

$x^2 + 11x + 30 = 0$

$(x + 6)(x + 5) = 0$

$x + 6 = 0 \Rightarrow x_1 = -6 \quad x + 5 = 0 \Rightarrow x_2 = -5$ $\quad S = \{-6 ; -5\}$

c) $x^2 + 42 = 13x$

$x^2 - 13x + 42 = 0$

$(x - 7)(x - 6) = 0$

$x - 7 = 0 \Rightarrow x_1 = 7 \quad x - 6 = 0 \Rightarrow x_2 = 6$ $\quad S = \{6 ; 7\}$

d) $x^2 - 2x - 35 = 0$

$(x - 7)(x + 5) = 0$

$x - 7 = 0 \Rightarrow x_1 = 7 \quad x + 5 = 0 \Rightarrow x_2 = -5$ $\quad S = \{-5 ; 7\}$

e) $x^2 - 4x - 96 = 0$

$(x - 12)(x + 8) = 0$

$x - 12 = 0 \Rightarrow x_1 = 12 \quad x + 8 = 0 \Rightarrow x_2 = -8$ $\quad S = \{-8 ; 12\}$

f) $x^2 + 6x - 72 = 0$

$(x + 12)(x - 6) = 0$

$x + 12 = 0 \Rightarrow x_1 = -12 \quad x - 6 = 0 \Rightarrow x_2 = 6$ $\quad S = \{-12 ; 6\}$

g) $x^2 + 3x = 28$

$x^2 + 3x - 28 = 0$

$(x + 7)(x - 4) = 0$

$x + 7 = 0 \Rightarrow x_1 = -7 \quad x - 4 = 0 \Rightarrow x_2 = 4$ $\quad S = \{-7; 4\}$

h) $x^2 = -4x + 77$

$x^2 + 4x - 77 = 0$

$(x + 11)(x - 7) = 0$

$x + 11 = 0 \Rightarrow x_1 = -11 \quad x - 7 = 0 \Rightarrow x_2 = 7$ $\quad S = \{-11; 7\}$

Exercice 2.1.7

Factorise les équations suivantes et détermine l'ensemble des solutions :

a) $9x^2 + 30x + 25 = 0$

$(3x + 5)^2 = 0$

$3x + 5 = 0 \Rightarrow x = -\frac{5}{3}$ $S = \{-\frac{5}{3}\}$

b) $49x^2 - 42x + 9 = 0$

$(7x - 3)^2 = 0$

$7x - 3 = 0 \Rightarrow x = \frac{3}{7}$ $S = \{\frac{3}{7}\}$

c) $16x^2 - 48x + 36 = 0$

$(4x - 6)^2 = 0$

$4x - 6 = 0 \Rightarrow x = \frac{6}{4} = \frac{3}{2}$ $S = \{\frac{3}{2}\}$

d) $49x^2 - 16 = 0$

$(7x - 4)(7x + 4) = 0$

$7x - 4 = 0 \Rightarrow x_1 = \frac{4}{7}$ $7x + 4 = 0 \Rightarrow x_2 = -\frac{4}{7}$ $S = \{-\frac{4}{7}; \frac{4}{7}\}$

e) $25x^2 - 16 = 0$

$(5x + 4)(5x - 4) = 0$

$5x + 4 = 0 \Rightarrow x_1 = -\frac{4}{5}$ $5x - 4 = 0 \Rightarrow x_2 = \frac{4}{5}$ $S = \{-\frac{4}{5}; \frac{4}{5}\}$

f) $2x^2 - 28x + 98 = 0$

$2(x^2 - 14x + 49) = 0$

$2(x - 7)^2 = 0$

$x - 7 = 0 \Rightarrow x = 7$ $S = \{7\}$

Exercice 2.1.8

Factorise les équations suivantes et détermine l'ensemble des solutions :

a) $81x^2 + 18x + 1 = 0$

$(9x + 1)^2 = 0$

$9x + 1 = 0 \Rightarrow x = -\frac{1}{9}$ $\quad S = \{-\frac{1}{9}\}$

b) $36x^2 + 60x + 25 = 0$

$(6x + 5)^2 = 0$

$6x + 5 = 0 \Rightarrow x = -\frac{5}{6}$ $\quad S = \{-\frac{5}{6}\}$

c) $64x^2 + 16x + 1 = 0$

$(8x + 1)^2 = 0$

$8x + 1 = 0 \Rightarrow x = -\frac{1}{8}$ $\quad S = \{-\frac{1}{8}\}$

d) $16x^2 + 48x + 36 = 0$

$(4x + 6)^2 = 0$

$4x + 6 = 0 \Rightarrow x = -\frac{6}{4} = -\frac{3}{2}$ $\quad S = \{-\frac{3}{2}\}$

e) $36x^2 - 48x + 16 = 0$

$(6x - 4)^2 = 0$

$6x - 4 = 0 \Rightarrow x = \frac{4}{6} = \frac{2}{3}$ $\quad S = \{\frac{2}{3}\}$

f) $36x^2 - 60x + 25 = 0$

$(6x - 5)^2 = 0$

$6x - 5 = 0 \Rightarrow x = \frac{5}{6}$ $\quad S = \{\frac{5}{6}\}$

g) $64x^2 - 16x + 1 = 0$

$(8x - 1)^2 = 0$

$8x - 1 = 0 \Rightarrow x = \frac{1}{8}$ $\quad S = \{\frac{1}{8}\}$

h) $4x^2 - 16 = 0$

$(2x - 4)(2x + 4) = 0$

$2x - 4 = 0 \Rightarrow x_1 = \frac{4}{2} = 2$ $\quad 2x + 4 = 0 \Rightarrow x_2 = -2$ $\quad S = \{-2 ; 2\}$

i) $9x^2 + 30x + 25 = 0$

$(3x + 5)^2 = 0$

$3x + 5 = 0 \Rightarrow x = -\frac{5}{3}$ $\quad S = \{-\frac{5}{3}\}$