

Exercice I

a) $A = \frac{7^{12} \times 7^{-4}}{(7^3)^2} = \frac{7^{12+(-4)}}{7^{3 \times 2}} = \frac{7^8}{7^6} = 7^{8-6} = 7^2$

$B = x^9 \times x^{-5} \times (x^3)^2 = x^4 \times x^6 = x^{10}$

$C = \frac{(3^4)^7}{2^{28} \times 5^{28}} = \frac{3^{28}}{(2 \times 5)^{28}} = \frac{3^{28}}{10^{28}} = \left(\frac{3}{10}\right)^{28} = 0,3^{28}$

b) $9^5 = (3^2)^5 = 3^{10}$

c) $D = a^{-14} b^{-6} (ab)^3 \times \left(\frac{b}{a}\right)^7 = a^{-14} b^{-6} \times a^3 b^3 \times \frac{b^7}{a^7} = \frac{a^{-14} \times a^3 \times b^{-6} \times b^3 \times b^7}{a^7} = \frac{a^{-11} \times b^4}{a^7}$

$D = \frac{a^{-11}}{a^7} \times b^4 = a^{-18} \times b^4$

d) $E = 3652 \times 10^{-11} = 3,652 \times 10^3 \times 10^{-11} = 3,652 \times 10^{-8}$

e) $\sqrt{13} \approx 3,606$ au millième près

Exercice II

1) $A = \sqrt{32} = \sqrt{16 \times 2} = \sqrt{16} \times \sqrt{2} = 4\sqrt{2}$

$B = \sqrt{12} - 7\sqrt{3} = \sqrt{4 \times 3} - 7\sqrt{3} = 2\sqrt{3} - 7\sqrt{3} = -5\sqrt{3}$

Exercice III

$A = \frac{2+\sqrt{2}}{3-\sqrt{2}} = \frac{(2+\sqrt{2})(3+\sqrt{2})}{(3-\sqrt{2})(3+\sqrt{2})}$

$A = \frac{6+2\sqrt{2}+3\sqrt{2}+2}{3^2 - (\sqrt{2})^2}$

$A = \frac{8+5\sqrt{2}}{9-2} = \frac{8+5\sqrt{2}}{7}$

Exercice IV

1) $P = UI$, donc $I = \frac{P}{U}$

2) $A = (4+\sqrt{3})^2$
 $A = 4^2 + 2 \times 4 \times \sqrt{3} + (\sqrt{3})^2$
 $A = 16 + 8\sqrt{3} + 3$
 $A = 19 + 8\sqrt{3}$

$B = 3\sqrt{50} + (3-2\sqrt{2})^2$
 $B = 3\sqrt{25 \times 2} + 3^2 - 2 \times 3 \times 2\sqrt{2} + (2\sqrt{2})^2$
 $B = 3 \times 5\sqrt{2} + 9 - 12\sqrt{2} + 2^2 \times (\sqrt{2})^2$
 $B = 15\sqrt{2} + 9 - 12\sqrt{2} + 8$
 $B = 17 + 3\sqrt{2}$

2) $-2x + 3yH = 4$

$3yH = 2x + 4$

$y = \frac{2x+4}{3H}$

3) $E = mc^2$

Donc $c^2 = \frac{E}{m}$ avec $\frac{E}{m} > 0$ et $c > 0$

donc $c = \sqrt{\frac{E}{m}}$

Exercice V

a) $2x + 7 = -4$
 $2x = -4 - 7 = -11$
 $x = -\frac{11}{2}$
 $\mathcal{S} = \left\{ -\frac{11}{2} \right\}$

b) $3(2x-5) + x = 4 - (3-4x)$

$6x - 15 + x = 4 - 3 + 4x$

$7x - 15 = 4x + 1$

$7x - 4x = 1 + 15$

$3x = 16$

$x = \frac{16}{3}$

$\mathcal{S} = \left\{ \frac{16}{3} \right\}$

c) $(6x-1)^2 = (4x+1)(9x-5)$

$(x)^2 - 2 \times 6x \times 1 + 1^2 = 4x \times 9x - 4x \times 5 + 9x - 5$

$36x^2 - 12x + 1 = 36x^2 - 11x - 5$ ($-4x \times 5 + 9x = -20x + 9x = -11x$)

$36x^2 = 12x + 1 - 36x^2 = -11x - 5$

$-12x + 1 = -11x - 5$

$1 + 5 = 12x - 11x$

$x = 6$

$\mathcal{S} = \{6\}$

d) $(x+1)^2 = 2x^2 - (3 - 2x + x^2)$

$x^2 + 2x + 1 = 2x^2 - 3 + 2x - x^2$

$x^2 + 2x + 1 = x^2 + 2x - 3$ (on simplifie dans chaque membre les quantités identiques).

$1 = -3$: égalité fautive pour tout réel x ! L'équation n'a pas de solution dans \mathbb{R} : $\mathcal{S} = \emptyset$.

Addendum : D de l'exercice I, question a).

$D = \frac{\sqrt{10^7}}{\sqrt{10^5}} \times 10^8 \times (\sqrt{10})^4 = \sqrt{\frac{10^7}{10^5}} \times 10^8 \times \left((\sqrt{10})^2 \right)^2 = \sqrt{10^2} \times 10^8 \times 10^2 = 10 \times 10^{10} = 10^{11}$