

**Exercice 1**

Donner la forme canonique des polynômes  $P$ ,  $Q$ ,  $R$  et  $S$ .

$$P(x) = 3x^2 + 5x - 3 \quad Q(x) = x^2 + 14x + 6 \quad R(x) = x^2 - 3x + 9 \quad S(x) = 9x^2 + 36x + 36$$

**Exercice 2**

Donner la forme canonique des polynômes  $P$ ,  $Q$ ,  $R$  et  $S$ .

$$P(x) = 16x^2 + 24x + 9 \quad Q(x) = x^2 - 6x + 7 \quad R(x) = x^2 + 9x - 1 \quad S(x) = 5x^2 + 2x - 2$$

**Exercice 3**

Donner la forme canonique des polynômes  $P$ ,  $Q$ ,  $R$  et  $S$ .

$$P(x) = 2x^2 + 7x + 4 \quad Q(x) = x^2 - 9x + 6 \quad R(x) = 4x^2 - 24x + 36 \quad S(x) = x^2 + 16x + 5$$

**Exercice 4**

Donner la forme canonique des polynômes  $P$ ,  $Q$ ,  $R$  et  $S$ .

$$P(x) = x^2 - 10x + 2 \quad Q(x) = 5x^2 - 7x - 2 \quad R(x) = 9x^2 - 30x + 25 \quad S(x) = x^2 + 5x + 2$$

**Exercice 5**

Donner la forme canonique des polynômes  $P$ ,  $Q$ ,  $R$  et  $S$ .

$$P(x) = x^2 - 6x + 4 \quad Q(x) = 16x^2 - 56x + 49 \quad R(x) = x^2 - 3x + 2 \quad S(x) = -4x^2 - 7x + 3$$

**Exercice 6**

Donner la forme canonique des polynômes  $P$ ,  $Q$ ,  $R$  et  $S$ .

$$P(x) = 64x^2 + 64x + 16 \quad Q(x) = x^2 + 8x - 8 \quad R(x) = x^2 + 5x - 4 \quad S(x) = -2x^2 - 3x - 5$$

**Exercice 7**

Donner la forme canonique des polynômes  $P$ ,  $Q$ ,  $R$  et  $S$ .

$$P(x) = x^2 + 18x - 4 \quad Q(x) = 4x^2 - 7x + 2 \quad R(x) = x^2 + 9x + 3 \quad S(x) = 9x^2 - 42x + 49$$

**Exercice 8**

Donner la forme canonique des polynômes  $P$ ,  $Q$ ,  $R$  et  $S$ .

$$P(x) = 49x^2 - 126x + 81 \quad Q(x) = x^2 + 3x - 2 \quad R(x) = -4x^2 - 7x - 4 \quad S(x) = x^2 + 2x - 6$$

**Corrigé de l'exercice 1**Donner la forme canonique des polynômes  $P$ ,  $Q$ ,  $R$  et  $S$ .

$$P(x) = 3x^2 + 5x - 3$$

$$= 3 \times \left( x^2 + \frac{5}{3}x - 1 \right)$$

$$= 3 \times \left( \left( x + \frac{5}{6} \right)^2 - \left( \frac{5}{6} \right)^2 - 1 \right)$$

$$= 3 \times \left( \left( x + \frac{5}{6} \right)^2 + \frac{-25}{36} - \frac{1 \times 36}{1 \times 36} \right)$$

$$= 3 \times \left( \left( x + \frac{5}{6} \right)^2 + \frac{-25}{36} - \frac{36}{36} \right)$$

$$= 3 \times \left( \left( x + \frac{5}{6} \right)^2 + \frac{-61}{36} \right)$$

$$= 3 \times \left( x + \frac{5}{6} \right)^2 + \frac{-61 \times 3}{3 \times 12}$$

$$P(x) = 3 \times \left( x + \frac{5}{6} \right)^2 + \frac{-61}{12}$$

$$Q(x) = x^2 + 14x + 6$$

$$= (x + 7)^2 - 7^2 + 6$$

$$= (x + 7)^2 + 49 + 6$$

$$Q(x) = (x + 7)^2 + 55$$

$$S(x) = 9x^2 + 36x + 36$$

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

$$= \left( 3 \times \left( x + \frac{6}{3} \right) \right)^2$$

$$S(x) = 9 \times (x + 2)^2$$

$$R(x) = x^2 - 3x + 9$$

$$= \left( x - \frac{3}{2} \right)^2 - \left( \frac{3}{2} \right)^2 + 9$$

$$= \left( x - \frac{3}{2} \right)^2 + \frac{-9}{4} + \frac{9 \times 4}{1 \times 4}$$

$$= \left( x - \frac{3}{2} \right)^2 + \frac{-9}{4} + \frac{36}{4}$$

$$R(x) = \left( x - \frac{3}{2} \right)^2 + \frac{27}{4}$$

**Corrigé de l'exercice 2**Donner la forme canonique des polynômes  $P$ ,  $Q$ ,  $R$  et  $S$ .

$$P(x) = 16x^2 + 24x + 9$$

$$= (4x + 3)^2$$

$$= \left( 4 \times \left( x + \frac{3}{4} \right) \right)^2$$

$$P(x) = 16 \times \left( x + \frac{3}{4} \right)^2$$

$$R(x) = x^2 + 9x - 1$$

$$= \left( x + \frac{9}{2} \right)^2 - \left( \frac{9}{2} \right)^2 - 1$$

$$= \left( x + \frac{9}{2} \right)^2 + \frac{-81}{4} - \frac{1 \times 4}{1 \times 4}$$

$$= \left( x + \frac{9}{2} \right)^2 + \frac{-81}{4} - \frac{4}{4}$$

$$R(x) = \left( x + \frac{9}{2} \right)^2 + \frac{-85}{4}$$

$$Q(x) = x^2 - 6x + 7$$

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

$$= (x - 3)^2 + 9 + 7$$

$$Q(x) = (x - 3)^2 + 16$$

$$S(x) = 5x^2 + 2x - 2$$

$$= 5 \times \left( x^2 + \frac{2}{5}x - \frac{2}{5} \right)$$

$$= 5 \times \left( \left( x + \frac{1}{5} \right)^2 - \left( \frac{1}{5} \right)^2 + \frac{-2}{5} \right)$$

$$= 5 \times \left( \left( x + \frac{1}{5} \right)^2 + \frac{-1}{25} + \frac{-2 \times 5}{5 \times 5} \right)$$

$$= 5 \times \left( \left( x + \frac{1}{5} \right)^2 + \frac{-1}{25} + \frac{-10}{25} \right)$$

$$= 5 \times \left( \left( x + \frac{1}{5} \right)^2 + \frac{-11}{25} \right)$$

$$= 5 \times \left( x + \frac{1}{5} \right)^2 + \frac{-11 \times 5}{5 \times 5}$$

$$S(x) = 5 \times \left( x + \frac{1}{5} \right)^2 + \frac{-11}{5}$$

**Corrigé de l'exercice 3**Donner la forme canonique des polynômes  $P$ ,  $Q$ ,  $R$  et  $S$ .

$$P(x) = 2x^2 + 7x + 4$$

$$= 2 \times \left( x^2 + \frac{7}{2}x + 2 \right)$$

$$= 2 \times \left( \left( x + \frac{7}{4} \right)^2 - \left( \frac{7}{4} \right)^2 + 2 \right)$$

$$= 2 \times \left( \left( x + \frac{7}{4} \right)^2 + \frac{-49}{16} + \frac{2 \times 16}{1 \times 16} \right)$$

$$= 2 \times \left( \left( x + \frac{7}{4} \right)^2 + \frac{-49}{16} + \frac{32}{16} \right)$$

$$= 2 \times \left( \left( x + \frac{7}{4} \right)^2 + \frac{-17}{16} \right)$$

$$= 2 \times \left( x + \frac{7}{4} \right)^2 + \frac{-17 \times 2}{2 \times 8}$$

$$P(x) = 2 \times \left( x + \frac{7}{4} \right)^2 + \frac{-17}{8}$$

$$Q(x) = x^2 - 9x + 6$$

$$= \left( x - \frac{9}{2} \right)^2 - \left( \frac{9}{2} \right)^2 + 6$$

$$= \left( x - \frac{9}{2} \right)^2 + \frac{-81}{4} + \frac{6 \times 4}{1 \times 4}$$

$$= \left( x - \frac{9}{2} \right)^2 + \frac{-81}{4} + \frac{24}{4}$$

$$Q(x) = \left( x - \frac{9}{2} \right)^2 + \frac{-57}{4}$$

$$R(x) = 4x^2 - 24x + 36$$

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

$$= \left( 2 \times \left( x - \frac{6}{2} \right) \right)^2$$

$$R(x) = 4 \times (x - 3)^2$$

$$S(x) = x^2 + 16x + 5$$

$$= (x + 8)^2 - 8^2 + 5$$

$$= (x + 8)^2 + 64 + 5$$

$$S(x) = (x + 8)^2 + 69$$

**Corrigé de l'exercice 4**Donner la forme canonique des polynômes  $P$ ,  $Q$ ,  $R$  et  $S$ .

$$P(x) = x^2 - 10x + 2$$

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

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

$$P(x) = (x - 5)^2 + 27$$

$$Q(x) = 5x^2 - 7x - 2$$

$$= 5 \times \left( x^2 - \frac{7}{5}x - \frac{2}{5} \right)$$

$$= 5 \times \left( \left( x - \frac{7}{10} \right)^2 - \left( \frac{7}{10} \right)^2 + \frac{-2}{5} \right)$$

$$= 5 \times \left( \left( x - \frac{7}{10} \right)^2 + \frac{-49}{100} + \frac{-2 \times 20}{5 \times 20} \right)$$

$$= 5 \times \left( \left( x - \frac{7}{10} \right)^2 + \frac{-49}{100} + \frac{-40}{100} \right)$$

$$= 5 \times \left( \left( x - \frac{7}{10} \right)^2 + \frac{-89}{100} \right)$$

$$= 5 \times \left( x - \frac{7}{10} \right)^2 + \frac{-89 \times 5}{5 \times 20}$$

$$Q(x) = 5 \times \left( x - \frac{7}{10} \right)^2 + \frac{-89}{20}$$

$$S(x) = x^2 + 5x + 2$$

$$= \left( x + \frac{5}{2} \right)^2 - \left( \frac{5}{2} \right)^2 + 2$$

$$= \left( x + \frac{5}{2} \right)^2 + \frac{-25}{4} + \frac{2 \times 4}{1 \times 4}$$

$$= \left( x + \frac{5}{2} \right)^2 + \frac{-25}{4} + \frac{8}{4}$$

$$S(x) = \left( x + \frac{5}{2} \right)^2 + \frac{-17}{4}$$

$$R(x) = 9x^2 - 30x + 25$$

$$= (3x - 5)^2$$

$$= \left( 3 \times \left( x - \frac{5}{3} \right) \right)^2$$

$$R(x) = 9 \times \left( x - \frac{5}{3} \right)^2$$

**Corrigé de l'exercice 5**Donner la forme canonique des polynômes  $P$ ,  $Q$ ,  $R$  et  $S$ .

$$\begin{aligned} P(x) &= x^2 - 6x + 4 \\ &= (x - 3)^2 - 3^2 + 4 \\ &= (x - 3)^2 + 9 + 4 \end{aligned}$$

$$P(x) = (x - 3)^2 + 13$$

$$\begin{aligned} R(x) &= x^2 - 3x + 2 \\ &= \left(x - \frac{3}{2}\right)^2 - \left(\frac{3}{2}\right)^2 + 2 \\ &= \left(x - \frac{3}{2}\right)^2 + \frac{-9}{4} + \frac{2 \times 4}{1 \times 4} \\ &= \left(x - \frac{3}{2}\right)^2 + \frac{-9}{4} + \frac{8}{4} \end{aligned}$$

$$R(x) = \left(x - \frac{3}{2}\right)^2 + \frac{-1}{4}$$

$$\begin{aligned} Q(x) &= 16x^2 - 56x + 49 \\ &= (4x - 7)^2 \\ &= \left(4 \times \left(x - \frac{7}{4}\right)\right)^2 \end{aligned}$$

$$Q(x) = 16 \times \left(x - \frac{7}{4}\right)^2$$

$$\begin{aligned} S(x) &= -4x^2 - 7x + 3 \\ &= -4 \times \left(x^2 + \frac{7}{4}x - \frac{3}{4}\right) \\ &= -4 \times \left(\left(x + \frac{7}{8}\right)^2 - \left(\frac{7}{8}\right)^2 + \frac{-3}{4}\right) \\ &= -4 \times \left(\left(x + \frac{7}{8}\right)^2 + \frac{-49}{64} + \frac{-3 \times 16}{4 \times 16}\right) \\ &= -4 \times \left(\left(x + \frac{7}{8}\right)^2 + \frac{-49}{64} + \frac{-48}{64}\right) \\ &= -4 \times \left(\left(x + \frac{7}{8}\right)^2 + \frac{-97}{64}\right) \\ &= -4 \times \left(x + \frac{7}{8}\right)^2 + \frac{-97 \times 4 \times (-1)}{4 \times 16} \end{aligned}$$

$$S(x) = -4 \times \left(x + \frac{7}{8}\right)^2 + \frac{97}{16}$$

**Corrigé de l'exercice 6**Donner la forme canonique des polynômes  $P$ ,  $Q$ ,  $R$  et  $S$ .

$$\begin{aligned} P(x) &= 64x^2 + 64x + 16 \\ &= (8x + 4)^2 \\ &= \left(8 \times \left(x + \frac{4}{8}\right)\right)^2 \end{aligned}$$

$$P(x) = 64 \times \left(x + \frac{1}{2}\right)^2$$

$$\begin{aligned} R(x) &= x^2 + 5x - 4 \\ &= \left(x + \frac{5}{2}\right)^2 - \left(\frac{5}{2}\right)^2 - 4 \\ &= \left(x + \frac{5}{2}\right)^2 + \frac{-25}{4} - \frac{4 \times 4}{1 \times 4} \\ &= \left(x + \frac{5}{2}\right)^2 + \frac{-25}{4} - \frac{16}{4} \end{aligned}$$

$$R(x) = \left(x + \frac{5}{2}\right)^2 + \frac{-41}{4}$$

$$\begin{aligned} Q(x) &= x^2 + 8x - 8 \\ &= (x + 4)^2 - 4^2 - 8 \\ &= (x + 4)^2 + 16 - 8 \end{aligned}$$

$$Q(x) = (x + 4)^2 + 8$$

$$\begin{aligned} S(x) &= -2x^2 - 3x - 5 \\ &= -2 \times \left(x^2 + \frac{3}{2}x + \frac{5}{2}\right) \\ &= -2 \times \left(\left(x + \frac{3}{4}\right)^2 - \left(\frac{3}{4}\right)^2 + \frac{5}{2}\right) \\ &= -2 \times \left(\left(x + \frac{3}{4}\right)^2 + \frac{-9}{16} + \frac{5 \times 8}{2 \times 8}\right) \\ &= -2 \times \left(\left(x + \frac{3}{4}\right)^2 + \frac{-9}{16} + \frac{40}{16}\right) \\ &= -2 \times \left(\left(x + \frac{3}{4}\right)^2 + \frac{31}{16}\right) \\ &= -2 \times \left(x + \frac{3}{4}\right)^2 + \frac{31 \times 2 \times (-1)}{2 \times 8} \end{aligned}$$

$$S(x) = -2 \times \left(x + \frac{3}{4}\right)^2 + \frac{-31}{8}$$

**Corrigé de l'exercice 7**Donner la forme canonique des polynômes  $P$ ,  $Q$ ,  $R$  et  $S$ .

$$\begin{aligned} P(x) &= x^2 + 18x - 4 \\ &= (x + 9)^2 - 9^2 - 4 \\ &= (x + 9)^2 + 81 - 4 \end{aligned}$$

$$P(x) = (x + 9)^2 + 77$$

$$\begin{aligned} Q(x) &= 4x^2 - 7x + 2 \\ &= 4 \times \left( x^2 - \frac{7}{4}x + \frac{1}{2} \right) \\ &= 4 \times \left( \left( x - \frac{7}{8} \right)^2 - \left( \frac{7}{8} \right)^2 + \frac{1}{2} \right) \\ &= 4 \times \left( \left( x - \frac{7}{8} \right)^2 + \frac{-49}{64} + \frac{1 \times 32}{2 \times 32} \right) \end{aligned}$$

$$= 4 \times \left( \left( x - \frac{7}{8} \right)^2 + \frac{-49}{64} + \frac{32}{64} \right)$$

$$= 4 \times \left( \left( x - \frac{7}{8} \right)^2 + \frac{-17}{64} \right)$$

$$= 4 \times \left( x - \frac{7}{8} \right)^2 + \frac{-17 \times 4}{4 \times 16}$$

$$Q(x) = 4 \times \left( x - \frac{7}{8} \right)^2 + \frac{-17}{16}$$

$$\begin{aligned} R(x) &= x^2 + 9x + 3 \\ &= \left( x + \frac{9}{2} \right)^2 - \left( \frac{9}{2} \right)^2 + 3 \\ &= \left( x + \frac{9}{2} \right)^2 + \frac{-81}{4} + \frac{3 \times 4}{1 \times 4} \\ &= \left( x + \frac{9}{2} \right)^2 + \frac{-81}{4} + \frac{12}{4} \end{aligned}$$

$$R(x) = \left( x + \frac{9}{2} \right)^2 + \frac{-69}{4}$$

$$S(x) = 9x^2 - 42x + 49$$

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

$$= \left( 3 \times \left( x - \frac{7}{3} \right) \right)^2$$

$$S(x) = 9 \times \left( x - \frac{7}{3} \right)^2$$

**Corrigé de l'exercice 8**Donner la forme canonique des polynômes  $P$ ,  $Q$ ,  $R$  et  $S$ .

$$\begin{aligned} P(x) &= 49x^2 - 126x + 81 \\ &= (7x - 9)^2 \\ &= \left( 7 \times \left( x - \frac{9}{7} \right) \right)^2 \end{aligned}$$

$$P(x) = 49 \times \left( x - \frac{9}{7} \right)^2$$

$$\begin{aligned} Q(x) &= x^2 + 3x - 2 \\ &= \left( x + \frac{3}{2} \right)^2 - \left( \frac{3}{2} \right)^2 - 2 \\ &= \left( x + \frac{3}{2} \right)^2 + \frac{-9}{4} - \frac{2 \times 4}{1 \times 4} \end{aligned}$$

$$= \left( x + \frac{3}{2} \right)^2 + \frac{-9}{4} - \frac{8}{4}$$

$$Q(x) = \left( x + \frac{3}{2} \right)^2 + \frac{-17}{4}$$

$$S(x) = x^2 + 2x - 6$$

$$= (x + 1)^2 - 1^2 - 6$$

$$= (x + 1)^2 + 1 - 6$$

$$S(x) = (x + 1)^2 - 5$$

$$\begin{aligned} R(x) &= -4x^2 - 7x - 4 \\ &= -4 \times \left( x^2 + \frac{7}{4}x + 1 \right) \\ &= -4 \times \left( \left( x + \frac{7}{8} \right)^2 - \left( \frac{7}{8} \right)^2 + 1 \right) \end{aligned}$$

$$= -4 \times \left( \left( x + \frac{7}{8} \right)^2 + \frac{-49}{64} + \frac{1 \times 64}{1 \times 64} \right)$$

$$= -4 \times \left( \left( x + \frac{7}{8} \right)^2 + \frac{-49}{64} + \frac{64}{64} \right)$$

$$= -4 \times \left( \left( x + \frac{7}{8} \right)^2 + \frac{15}{64} \right)$$

$$= -4 \times \left( x + \frac{7}{8} \right)^2 + \frac{15 \times 4 \times (-1)}{4 \times 16}$$

$$R(x) = -4 \times \left( x + \frac{7}{8} \right)^2 + \frac{-15}{16}$$