Factorise these Cubics

Easier…

1. $x^3 - 9x^2 + 26x - 24$
2. $x^3 - x^2 - x + 1$
3. $x^3 - 3x^2 - 4x + 12$
4. $x^3 + 4x^2 - 7x - 10$

Harder…

5. $3x^3 - 8x^2 + 3x + 2$
6. $5x^3 + 6x^2 - 9x - 2$
7. $-2x^3 - 5x^2 + x + 6$
8. $10x^3 + 37x^2 + 22x + 3$
9. $-3x^3 + 7x^2 + 22x - 8$
10. $x^3 - x^2 - 6x$

Consider further the equation developed from question 1 above…

$x^3 - 9x^2 + 26x - 24 = 0$ which can also be written as $(x - 2)(x - 3)(x - 4) = 0$

a) What are values of the roots?

b) What is the product of the roots?

c) What is the sum of the roots?

d) What is the sum of the product-of-pairs-of-roots?

Make three combinations of pairs of roots and find the product of each of these pairs, then add these three products together. E.g., one pair could be 2 and 3, which multiply to make 6. Repeat for the other two possible pairs then add all three of these products together.

e) What do you notice here?

Factorise these Cubics - Answers

Easier…

1. $x^3 - 9x^2 + 26x - 24 = (x-2)(x-3)(x-4)$
2. $x^3 - x^2 - x + 1 = (x-1)(x-1)(x+1) = (x-1)^2(x+1)$
3. $x^3 - 3x^2 - 4x + 12 = (x-2)(x-3)(x+2)$
4. $x^3 + 4x^2 - 7x - 10 = (x+1)(x-2)(x+5)$

Harder…

5. $3x^3 - 8x^2 + 3x + 2 = (3x+1)(x-2)(x-1)$
6. $5x^3 + 6x^2 - 9x - 2 = (5x+1)(x-1)(x+2)$
7. $-2x^3 - 5x^2 + x + 6 = (2x+3)(x+2)(1-x)$
8. $10x^3 + 37x^2 + 22x + 3 = (2x+1)(5x+1)(x+3)$
9. $-3x^3 + 7x^2 + 22x - 8 = (3x-1)(4-x)(x+2)$
10. $x^3 - x^2 - 6x = x(x-3)(x+2)$

Consider further the equation developed from question 1 above…

$x^3 - 9x^2 + 26x - 24 = 0$ which can also be written as $(x-2)(x-3)(x-4) = 0$

a) What are values of the roots? $2, 3, 4$

b) What is the product of the roots? 24

c) What is the sum of the roots? 9

d) What is the sum of the product-of-pairs-of-roots? -26

Make three combinations of pairs of roots and find the product of each of these pairs, then add these three products together. E.g., one pair could be 2 and 3, which multiply to make 6. Repeat for the other two possible pairs then add all three of these products together.

e) What do you notice here?