EXAM 1_4 (Polynomials)

1) Work out: (2.5 points)

a. $2(x^3 - x^2 + 2x - 3) - (2x^3 + 2x^2 - 1) =$

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

c. $(x^3 - 2x)(x^4 - x^2 + 2x - 1) =$

2) Complete: (2 points)

a. $(1 + 2x)^2 = 1 + ... + ...$

b. $(...... + 7)(...... - 7) = 9x^4 - ....$

c. $(...... - ......)^2 = x^4 - 8x^2 + ...$

d. $(x - ......)(x + ...) = ... - \dfrac{25}{9}$

3) Factorise the following: (2.5 points)

a. $3x^3 - 18x^2 + 27x =$

b. $4x^2 - 9 =$

c. $mn^3 - 10mn^2 + 25mn =$

d. $27y^3 - 12y =$

e) $5xy^3 + 40xy^2 + 80xy =$

4) Work out and simplify: (3 points)

a. $(x - 3)^2 - (x - 1)(x + 1) + 12x - 10 =$

b. $2(x - 2)^2 - 3x(2x - 3) - (1 + 2x)(1 - 2x) =$

c. $\dfrac{x + 1}{2} - \dfrac{2x - 2}{8} + \dfrac{1 - 2x}{6} - \dfrac{1}{12} =$

SOLUTION

1) Work out:

a. $2(x^3 - x^2 + 2x - 3) - (2x^3 + 2x^2 - 1) = 2x^3 - 2x^2 + 4x - 6 - 2x^3 - 2x^2 + 1 =$
$= -4x^2 + 4x - 5$

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

c. $(x^3 - 2x)(x^4 - x^2 + 2x - 1) = x^7 - x^5 + 2x^4 - x^3 - 2x^5 + 2x^3 - 4x^2 + 2x =$
$x^7 - 3x^5 + 2x^4 + x^3 - 4x^2 + 2x$

2) Complete:

a. $(1 + 2x)^2 = 1 + 4x + 4x^2$

b. $(3x^2 + 7)(3x^2 - 7) = 9x^4 - 49$

c. $(x^2 - 4)^2 = x^4 - 8x^2 + 16$

d. $\left(x - \dfrac{5}{3}\right)\left(x + \dfrac{5}{3}\right) = x^2 - \dfrac{25}{9}$

3) Factorise the following:

a. $3x^3 - 18x^2 + 27x = 3x(x^2 - 6x + 9) = 3x(x - 3)^2$

b. $4x^2 - 9 = (2x - 3)(2x + 3)$

c. $mn^3 - 10mn^2 + 25mn = mn(n^2 - 10n + 25) = mn(n - 5)^2$

d. $27y^3 - 12y = 3y(9y^2 - 4) = 3y(3y - 2)(3y + 2)$

e. $5xy^3 + 40xy^2 + 80xy = 5xy(y^2 + 8y + 16) = 5xy(y + 4)^2$

4) Work out and simplify:

a. $(x - 3)^2 - (x - 1)(x + 1) + 12x - 10 = x^2 - 6x + 9 - (x^2 - 1) + 12x - 10 =$
$= x^2 - 6x + 9 - x^2 + 1 + 12x - 10 = 6x$

b.
$2(x - 2)^2 - 3x(2x - 3) - (1 + 2x)(1 - 2x) = 2(x^2 - 4x + 4) - 6x^2 + 9x - (1 - 4x^2) =$
$= 2x^2 - 8x + 8 - 6x^2 + 9x - 1 + 4x^2 = x + 7$

c. $\dfrac{x + 1}{2} - \dfrac{2x - 2}{8} + \dfrac{1 - 2x}{6} - \dfrac{1}{12} = \dfrac{12(x + 1)}{24} - \dfrac{3(2x - 2)}{24} + \dfrac{4(1 - 2x)}{24} - \dfrac{2}{24} =$

$= \dfrac{12x + 12}{24} - \dfrac{6x - 6}{24} + \dfrac{4 - 8x}{24} - \dfrac{2}{24} = \dfrac{12x + 12 - 6x + 6 + 4 - 8x - 2}{24} = \dfrac{10 - x}{12}$