

## Twelfth Set of Homework for Math 05

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**Please note:** You should fully justify your answers.

### 1 Products of Polynomials

1. Simplify the following:

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

(b)  $-2xy(-3xy^2)^3(-x^4y^5)^2$

2. Expand and simplify:

(a)  $-2x(x^3 + 4x^2 - 5x - 21)$

(b)  $(a - 2)(a + 2)$

(c)  $(x + 2)(x - 7)$

(d)  $(2x - 3y)(2x + 3y)$

(e)  $(x - 8)(x + 1)$

(f)  $(2x - 3)(3x + 7)$

(g)  $(x^2 - 4)(x^2 + 4)$

(h)  $(3x - y)(4x - 3y)$

(i)  $(2x - 1)(3x^3 - 2x^2 + 3x - 7)$

(j)  $(x - 2)(x^2 + 2x + 4)$

(k)  $(x + 3)(x^2 - 3x + 9)$

(l)  $(x + 2)(x^4 - 2x^3 + 4x^2 - 8x + 16)$

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

(n)  $(x - 1)(x + 1)(x + 2)$

(o)  $(a - 1)(a + 1)(a^2 + 1)$

3. Expand and simplify:

(a)  $(x + 2)^2$

(b)  $(-x + 2)^2$

(c)  $(2x + 3)^2$

(d)  $(x - 1)^2$

(e)  $(x + 2)^2$

(f)  $(x + 2)^3$

(g)  $(3x - 5y)^2$

(h)  $(a + b)^2$

(i)  $(a - b)^2$

(j)  $(a - b)^3$

(k)  $(a + b)^3$

(l)  $(a + b)^4$

(m)  $(a + b + c)^2$

4. Put the following polynomials in Simplified Expanded Form:

(a)  $(x - y)^2 - (x - y)(x + y)$

(b)  $(x + 3)^2 - (x - 3)^2$

(c)  $(a + b + c)^2 - (a + b - c)^2$

(d)  $(x + y + z)^2 + (x - y)^2 + (y - z)^2 + (x - z)^2$

(e)  $(x + y)^2 - 2x^2 + (y - x)(x + y) + 2xy$

(f)  $(a - b)^3 - (a + b)^3 + 2b(3a^2 + b^2)$

(g)  $(a - b)((2a - b)^2 - (a - 2b)^2) + 3ab(a + b)$

## 2 Dividing polynomials by monomials

1. Perform the following divisions:

(a)  $\frac{2ab - 3b}{b}$

(b)  $\frac{6x - 12}{4}$

(c)  $\frac{15x^3 - 3x^2 + 6x}{3x}$

(d)  $\frac{3xy - 4x^2 + x}{x}$

(e)  $\frac{25x^2y^3 - 10x^4y^2 - 5xy^2}{5xy}$

(f)  $\frac{3a^4b^3c^2 - 6ab^2c - 2a^2b^2c^2}{3abc}$

(g)  $\frac{4x^3y^4z^5w^3 - 2x^2yz^3w^4 + 6x^5y^3z^4w^5 - 8x^2y^2z^3w^4}{-2x^2yz^2w^3}$

2. Simplify the following expressions:

(a)  $\frac{(2a - 3b)(4a + 3b) - 8a^2}{3b}$

(b)  $\frac{(2x + 3y)^2 - 4x^2 - 9y^2}{2xy}$

(c)  $\frac{(a + b)^3 - a^3 - b^3}{3ab}$

(d)  $\frac{(a + b)^2 - 4ab}{(a - b)^2}$