

Thirteenth Set of Homework for Math 05
The Answers

Nikos Apostolakis

1 Products of Polynomials

1. Simplify the following:

(a) $3x^5(-2x^2)^3$ $-24x^{11}$

(b) $-2xy(-3xy^2)^3(-x^4y^5)^2$ $54x^{12}y^{17}$

2. Expand and simplify:

(a) $-2x(x^3 + 4x^2 - 5x - 21)$ $-2x^4 - 8x^3 + 10x^2 + 42x$

(b) $(a - 2)(a + 2)$ $a^2 - 4$

(c) $(x + 2)(x - 7)$ $x^2 - 5x - 14$

(d) $(2x - 3y)(2x + 3y)$ $4x^2 - 9y^2$

(e) $(x - 8)(x + 1)$ $x^2 - 7x - 8$

(f) $(2x - 3)(3x + 7)$ $6x^2 + 5x - 21$

(g) $(x^2 - 4)(x^2 + 4)$ $x^4 - 16$

(h) $(3x - y)(4x - 3y)$ $12x^2 - 13xy + 3y^2$

(i) $(2x - 1)(3x^3 - 2x^2 + 3x - 7)$ $6x^4 - 7x^3 + 8x^2 - 17x + 7$

(j) $(x - 2)(x^2 + 2x + 4)$ $x^3 - 8$

(k) $(x + 3)(x^2 - 3x + 9)$ $x^3 + 27$

(l) $(x + 2)(x^4 - 2x^3 + 4x^2 - 8x + 16)$ $x^5 + 32$

(m) $x(3x^2 - 7)(x - 2)$ $3x^4 - 6x^3 - 7x^2 + 14x$

(n) $(x - 1)(x + 1)(x + 2)$ $x^3 + 2x^2 - x - 2$

(o) $(a - 1)(a + 1)(a^2 + 1)$ $a^4 - 1$

3. Expand and simplify:

(a) $(x + 2)^2$ $x^2 + 4x + 4$

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

(c) $(2x + 3)^2$ $4x^2 + 12x + 9$

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

(e) $(x + 2)^2$ $x^2 + 4x + 4$

(f) $(x + 2)^3$ $x^3 + 6x^2 + 12x + 8$

(g) $(3x - 5y)^2$ $9x^2 - 30xy + 25y^2$

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

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

(j) $(a - b)^3$ $a^3 - 3ba^2 + 3ab^2 - b^3$

(k) $(a + b)^3$ $a^3 + 3ba^2 + 3ab^2 + b^3$

(l) $(a + b)^4$ $a^4 + 4ab^3 + 6a^2b^2 + 4ba^3 + b^4$

(m) $(a + b + c)^2$ $a^2 + b^2 + c^2 + 2ab + 2ac + 2bc$

4. Put the following polynomials in Simplified Expanded Form:

- (a) $(x - y)^2 - (x - y)(x + y)$ $2y^2 - 2xy$
 (b) $(x + 3)^2 - (x - 3)^2$ $12x$
 (c) $(a + b + c)^2 - (a + b - c)^2$ $4ac + 4bc$
 (d) $(x + y + z)^2 + (x - y)^2 + (y - z)^2 + (x - z)^2$ $3x^2 + 3y^2 + 3z^2$
 (e) $(x + y)^2 - 2x^2 + (y - x)(x + y) + 2xy$ $-2x^2 + 4xy + 2y^2$
 (f) $(a - b)^3 - (a + b)^3 + 2b(3a^2 + b^2)$ 0
 (g) $(a - b)((2a - b)^2 - (a - 2b)^2) + 3ab(a + b)$ $3a^3 + 3b^3$

2 Dividing polynomials by monomials

1. Perform the following divisions:

- (a) $\frac{2ab - 3b}{b}$ $2a - 3$
 (b) $\frac{6x - 12}{4}$ $\frac{3}{2}x - 3$
 (c) $\frac{15x^3 - 3x^2 + 6x}{3x}$ $5x^2 - x + 2$
 (d) $\frac{3xy - 4x^2 + x}{x}$ $3y - 4x + 1$
 (e) $\frac{25x^2y^3 - 10x^4y^2 - 5xy^2}{5xy}$ $5xy^2 - 2yx^3 - y$
 (f) $\frac{3a^4b^3c^2 - 6ab^2c - 2a^2b^2c^2}{3abc}$ $ca^3b^2 - 2b - \frac{2}{3}abc$
 (g) $\frac{4x^3y^4z^5w^3 - 2x^2yz^3w^4 + 6x^5y^3z^4w^5 - 8x^2y^2z^3w^4}{-2x^2yz^2w^3}$ $4wyz + wz - 2xy^3z^3 - 3w^2x^3y^2z^2$

2. Simplify the following expressions:

- (a) $\frac{(2a - 3b)(4a + 3b) - 8a^2}{3b}$ $-2a - 3b$
 (b) $\frac{(2x + 3y)^2 - 4x^2 - 9y^2}{2xy}$ 6
 (c) $\frac{(a + b)^3 - a^3 - b^3}{3ab}$ $a + b$
 (d) $\frac{(a + b)^2 - 4ab}{(a - b)^2}$ 1