Twelfth Set of Homework for Math 05

Nikos Apostolakis

Please note: You should fully justify your answers.

1 Generalities about polynomials

1. Evaluate each of the following polynomials at the given values of the variables.
   (a) $x^2 - y^2$; $\quad x = -2, y = -4$
   (b) $(x+3)^2 - x - 3$; $\quad x = -3$
   (c) $-x + 2x^2 - x^3$; $\quad x = -2$
   (d) $x^3 - 9x^2 + 27x - 27$; $\quad x = 2$
   (e) $2(x-3)^2 - (x-3) + 7$; $\quad x = 4$
   (f) $-2(x+3)(2x-5)$; $\quad x = -5$
2. Let $p(x) = 3x^2 - 5x - 7$ and $q(x) = x^2 - 8x + 7$. Find:
   (a) $p(0)$
   (b) $p(-1)$
   (c) $p(-2)$
   (d) $q(0)$
   (e) $q(1)$
   (f) $q(7)$
   (g) $p(3) - q(3)$
   (h) $p(1) \cdot q(-1)$

2 Adding and subtracting polynomials

1. Find the simplified expanded form of the following polynomials:
   (a) $(-5x^4 + 2x^3 - 3x^2 - 4x + 3) + (7x^4 + 6x^3 - 2x^2 + 8x + 3)$
   (b) $2x^2 - (2x^2 - 1)$
   (c) $(x^2 - 3x - 21) - (-2x^2 - 5x - 14)$
   (d) $7xy^2 - 8x^2y - (5x^2y - 3xy^2 - 5)$
   (e) $-(3x^5 - 2x^4 + 2x^2 - 9) + (5x^4 - 2x^3 - 2x^2 - 3) - (-3x^2 - 3x - 1)$
   (f) $-\big((x^2 - 5x + 7) - (3x^2 + 5x + 7)\big)$
2. Find the simplified expanded form of the following:
   (a) The sum of $-3x^3 + 5x^2 - 2x + 3$ and $x^2 + 5x - 7$
   (b) The sum of $x^4 - 2x^2 + 11$ and $5x^3 + 2x^2 - 8x - 5$
   (c) The sum of $x^3 + 2xy^2 - 3x^2y + y^3$ and $-2x^3 + 3x^2y - 3y^3$
   (d) The opposite of $5x^2 - 7x - 3$
   (e) The opposite of $-12x^3 + 2x^2 - 6x - 1$
   (f) The difference of $6x^3 - 3x^2 + 2x - 8$ and $-5x^5 + 2x^4 + 3x^3 + 2x$
   (g) The opposite of the difference of $2x^4 - 3x^2 + 7$ and $2x^2 + 3x^2 - 8$
   (h) $-2x^3 + x$ subtracted from $x^3 + 2x^2 - 3x - 8$