Factor out the greatest common factor.

1. \(2x^4 + 4x^3 + 6x^2\).
2. \(3x^5 - 6x^4 + 9x^3\).
3. \(x^3 + x^2 + x\).
4. \(2x^5 + 2x^4 - 2x^3 + 2x^2\).

5. For each of these numbers, list all possible factorings into two integers. (For 6, for example, you would write (1)(6), (-1)(-6), (2)(3), and (-2)(-3).)
   a. 4.
   b. -3.
   c. 10.
   d. -12.
   e. -25.

6. For each of the following polynomials, list all possible x-coefficients for which the polynomial would factor nicely. (For \(x^2 + ??x + 6\), the possible nice x-coefficients would be \(1 + 6 = 7\), \((-1) + (-6) = -7\), \((2) + (3) = 5\), and \((-2) + (-3) = -5\). You would answer 7, -7, 5, and -5.)
   a. \(x^2 + ??x + 4\).
   b. \(x^2 + ??x - 3\).
   c. \(x^2 + ??x + 10\).
   d. \(x^2 + ??x - 12\).
   e. \(x^2 + ??x - 25\).

Factor the following polynomials.

7. \(x^2 - 4x - 12\).
8. \(x^2 + 6x + 5\).
9. \(x^2 - 4x - 5\).
10. \(x^2 - 7x + 12\).

Answers on next page.
Answers: 1) \(2x^2(x^2 + 2x + 3)\). 2) \(3x^3(x^2 - 2x + 3)\). 3) \(x(x^2 + x + 1)\). 4) \(2x^2(x^3 + x^2 - x + 1)\).

5a) \((1)(4), (−1)(−4), (2)(2), \) and \((−2)(−2)\).
   b) \((1)(−3), (−1)(3)\).
   c) \((1)(10), (−1)(−10), (2)(5), \) and \((−2)(−5)\).
   d) \((1)(−12), (−1)(12), (2)(−6), (−2)(6), (3)(−4), (−3)(4)\).
   e) \((1)(−25), (−1)(25), (5)(−5)\).

6a) \((1) + (4) = 5, (−1) + (−4) = −5, (2) + (2) = 4, \) and \((−2) + (−2) = −4\).
   b) \((1) + (−3) = −2, (−1) + (3) = 2\).
   c) \((1) + (10) = 11, (−1) + (−10) = −11, (2) + (5) = 7, \) and \((−2) + (−5) = −7\).
   d) \((1) + (−12) = −11, (−1) + (12) = 11, (2) + (−6) = −4, (−2) + (6) = 4, (3) + (−4) = −1, (−3) + (4) = 1\).
   e) \((1) + (−25) = −24, (−1) + (25) = 24, (5) + (−5) = 0\).

7) \((x − 6)(x + 2)\). 8) \((x + 1)(x + 5)\). 9) \((x − 5)(x + 1)\). 10) \((x − 3)(x − 4)\).