

1. Factor the following.

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

(b) $3y^2 + 10y + 3$

(c) $x^2y^2 + 4xy + 4$

(d) $9z^2 - 6zy - 8y^2$

(e) $y^2 - 81x^4$

(f) $y^6 - 1$

(g) $(f + 2)^2 - (f - 2)^2$

(h) $11x^4y^4 + 22x^3y^3 + 3xy + 6$

(i) $x^4 + y^3 - x^2y^2 - yx^2$

(j) $x^4 - 81$

(k) $(a + b^2)^2 - 7(a + b^2) + 6$

(l) $p^3 - p(p + q)^2$

(m) $a^3 - a^2 - a + 1$

2. Expand the following. Hint: Some of these take a lot less work than it looks like they do.

(a) $(x + \frac{1}{x})^2$

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

(c) $(x - 1)^4$

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

3. Factor or use the quadratic equation to solve the following.

(a) $x^2 - 1 = 0$

(b) $x^4 - 16 = 0$

(c) $x^3 + 8 = 0$

(d) $x^3 - 7x^2 + 12x = 0$

(e) $2x^2 + x - 1 = 0$

(f) $4(x + 2)^2 + 4(x + 2) + 1 = 0$

(g) $x^3 + 3x^2 + 3x + 1 = 0$

(h) $xy + 2x + y + 2 = 0$

(i) $x^4 - 9 = 0$