

Find the zeros of the polynomial function and state the multiplicity of each zero.

1. a)  $y = (x-1)^3(x+2)^4$                       b)  $y = (x^2 - 4)^3$

One zero of the polynomial is given; find all the zeros.

2. a)  $x^4 - 2x^3 + 5x^2 - 6x + 6 = 0$ ;  $1+i$                       b)  $x^4 + 2x^2 - 63 = 0$ ;  $-3i$

**Simplify each complex expression:**

3.  $(3 + 4i) - (5 - 6i)$

7.  $-i^7$

4.  $i^{77}$

8.  $(2 - 3i) + (5 + 6i)$

5.  $\frac{1+3i}{5-i}$

9.  $(2+5i)(2-5i)$

6.  $(1 - 5i)(5 - i)$

10.  $\frac{1-8i}{3+2i}$

Use the quadratic formula to solve:

11. a)  $2x^2 - 5x - 3 = 0$

b)  $x^2 - 5x + 3 = 0$

Find all the zeros of  $f$  in the complex number system; then write  $f(x)$  as a product of linear factors (**factored form**).

12.  $x^2 + 3x + 10 = 0$

13.  $x^3 - 6x^2 + 11x - 6 = 0$

Solve the equation in the complex number system:

14.  $x^3 - 27 = 0$

15.  $x^4 - 1 = 0$

16. Find a fourth- degree polynomial  $f$  whose only zeros are  $2 + i$  and  $2 - i$  such that  $f(-1) = 50$ .

Find  $x$  and  $y$  :

17.  $3x + 6i = 12 - 3yi$

18.  $(5x + 3yi) + (2y - xi) = 3 - i$