

Simplify . Write your answers in $a + bi$ form.

1. $(2 - 3i) + (-4 + 6i)$

6. i^{102}

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

7. $(-i)^6$

3. $(-1 + 2i)(-1 - 2i)$

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

4. $(1 + i)^2$

9. $\frac{2+5i}{3i}$

5. $(-1 + 3i)(2 + i)$

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

Use the quadratic formula to solve:

11. $x^2 + 2x + 4 = 0$

12. $2x^2 - 3x - 5 = 0$

Solve the equation in the complex number system:

13. $x^3 - 64 = 0$

14. $x^4 - 81 = 0$

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

15. $x^4 + x^3 + 2x^2 + x + 1 = 0, \quad i$

16. $x^3 - 8x^2 + 22x - 20 = 0, \quad 3 - i$

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

17. $(x^2 + 4)^2(x - 3)^3$

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

18. $f(x) = x^4 - 5x^3 + 4x^2 + 2x - 8$

19. Find a three degree polynomial f whose only zeros are $2 + 3i$ and -2 such that $f(2) = -3$.

20. Find x and y : $2x - 3i = -8 + 6yi$.