

Perform the indicated operations on the following complex numbers. Leave answer in  $a+bi$  form.

1.  $(-8-\sqrt{-9})+(2-\sqrt{-64})=$

2.  $(5+\sqrt{-9})(2-\sqrt{-49})=$

3.  $\frac{15-3i}{2-3i}=$

4.  $(-3-7i)(1+2i)=$

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

6. Write as 1,  $-1$ ,  $i$ , or  $-i$ :  $i^{97}$

7. Solve by factoring:

a)  $x^2 - 2x - 15 = 0$     b)  $3x^2 - 4x = 15$

8. Solve by completing the square:

a)  $x^2 + 10x = 14$     b)  $2x^2 + 3x - 2 = 0$

9. Solve by using the quadratic formula:

a)  $2x^2 + x - 5 = 0$     b)  $6x = -3 - 2x^2$

10. Solve by any means:

a.  $3(x-6)^2 = 27$     b)  $1 - \frac{5}{x} - \frac{6}{x^2} = 0$     c)  $x(x+1) = 12$

11. What must be true of the discriminant if a quadratic equation has two distinct real roots? How many  $x$  intercepts would the equation have?

12. What must be true of the discriminant if a quadratic equation has only one distinct real root? How many  $x$  intercepts would the equation have?

13. What must be true of the discriminant if a quadratic equation has two complex roots? How many  $x$  intercepts would the equation have?

14. Solve:  $x - 3\sqrt{x} - 10 = 0$

15. Solve:  $x^4 - x^2 - 12 = 0$

16. Solve:  $(x^2 - 2)^2 - 4(x^2 - 2) - 60 = 0$

17. Let  $y = -x^2 - 8x - 15$

a) Find the vertex (both  $x$  and  $y$  coordinates)

b) What is the axis of symmetry (give the equation)

c) Find both  $x$  and  $y$  intercepts

d) Graph  $y = -x^2 - 8x - 15$

18. Find the solution: a)  $\frac{x-5}{x+4} \leq 0$     b)  $x^2 + 2x < 3$

c)  $\frac{x-4}{(x+1)^2(x-6)} \geq 0$