

Find the zeros or roots of each function or equation by **FACTORING**. (Exact answers ONLY!)

1. $f(x) = -x^2 - 11x - 30$

$$0 = -(x^2 + 11x + 30)$$

$$0 = -(x^2 + 6x + 5x + 30)$$

$$0 = -(x(x+6) + 5(x+6))$$

$$0 = -(x+6)(x+5)$$

$$x = -6 \quad x = -5$$

3. $36x^2 = 4$

$$36x^2 - 4 = 0 \leftarrow \text{Difference of Two Squares}$$

$$(6x+2)(6x-2) = 0$$

$$x = -1/3 \quad x = 1/3$$

2. $g(x) = 2x^2 - 25x + 12$

$$0 = 2x^2 - 1x - 24x + 12$$

$$0 = x(2x-1) - 12(2x-1)$$

$$0 = (2x-1)(x-12)$$

$$x = 1/2 \quad x = 12$$

4. $56x = 8x^2 + 98$

$$0 = 8x^2 - 56x + 98$$

$$0 = 2(4x^2 - 28x + 49) \leftarrow \text{Perfect Square Trinomial}$$

$$0 = 2(2x - 7)^2$$

$$x = 7/2$$

5. Write a quadratic function in standard form with zeros 6 and -1.

$$(x-6)(x+1) = x^2 - 5x - 6$$

6. Write an equation in standard form with roots 3, -2.

$$(x-3)(x+2) = x^2 - x - 6$$

Complete the square for each expression. Write the resulting expression as a binomial squared.

7. $x^2 - 22x + 121 = (x-11)^2$

8. $x^2 + 9x + 81/4 = (x+9/2)^2$

Solve each equation by completing the square. (Exact answers only!)

9. $14x + x^2 = 24$

$$x^2 + 14x + 49 = 24 + 49$$

$$(x+7)^2 = 73$$

$$x+7 = \pm\sqrt{73}$$

$$x = -7 \pm \sqrt{73}$$

10. $2x^2 - 8x = -2$

$$2(x^2 - 4x + 4) = -2 + 2(4)$$

$$2(x-2)^2 = 6$$

$$(x-2)^2 = 3$$

$$x-2 = \pm\sqrt{3}$$

$$x = 2 \pm \sqrt{3}$$

11. $x^2 = 3x + 4$

$$x^2 - 3x + 9/4 = 4 + 9/4$$

$$(x-3/2)^2 = 25/4$$

$$x-3/2 = \pm 5/2$$

$$x = \frac{3}{2} \pm \frac{5}{2}$$

$$x = 4, -1$$

12. $4x^2 + 32x + 16 = 0$

$$4(x^2 + 8x + 16) = -16 + 4(16)$$

$$4(x+4)^2 = 48$$

$$(x+4)^2 = 12$$

$$x+4 = \pm 2\sqrt{3}$$

$$x = -4 \pm 2\sqrt{3}$$

Remember to look over section 4.4 as well: Solving Nonlinear Systems by graphing, substitution, and elimination. You have the review from yesterday!

Write each function in vertex form, and identify its vertex.

13. $f(x) = x^2 - 4x - 17$

$$f(x) + 17 + 4 = x^2 - 4x + 4$$

$$f(x) + 21 = (x - 2)^2$$

$$f(x) = (x - 2)^2 - 21$$

$V(2, -21)$

14. $h(x) = 3x^2 - 24x + 15$

$$h(x) - 15 + 3(16) = 3(x^2 - 8x + 16)$$

$$h(x) + 33 = 3(x - 4)^2$$

$$h(x) = 3(x - 4)^2 - 33$$

$V(4, -33)$

Find the zeros of each function by using the Quadratic Formula. (Exact answers ONLY!)

15. $f(x) = x^2 + 10x + 9$

$$x = \frac{-(-10) \pm \sqrt{100 - 4(1)(9)}}{2(1)}$$

$$x = \frac{-10 \pm \sqrt{64}}{2} = \frac{-10 \pm 8}{2}$$

$$x = -1, -9$$

17. $f(x) = x^2 + 2x - 3$

$$x = \frac{-(-2) \pm \sqrt{4 - 4(1)(-3)}}{2(1)}$$

$$x = \frac{-2 \pm \sqrt{16}}{2} = \frac{-2 \pm 4}{2}$$

$$x = 1, -3$$

19. $g(x) = 2x^2 + 3x + 1$

$$x = \frac{-(-3) \pm \sqrt{9 - 4(2)(1)}}{2(2)}$$

$$x = \frac{-3 \pm \sqrt{1}}{4} = \frac{-3 \pm 1}{4}$$

$$x = -\frac{1}{2}, 1$$

16. $g(x) = 2x^2 + 4x - 12$

$$x = \frac{-(-4) \pm \sqrt{16 - 4(2)(-12)}}{2(2)}$$

$$x = \frac{-4 \pm \sqrt{112}}{4} = \frac{-4 \pm 4\sqrt{7}}{4} = -1 \pm \sqrt{7}$$

18. $h(x) = x^2 - x + 12$

$$x = \frac{-(-1) \pm \sqrt{1 - 4(1)(12)}}{2(1)}$$

$$x = \frac{1 \pm \sqrt{-47}}{2} = \frac{1 \pm i\sqrt{47}}{2}$$

20. $g(x) = x^2 + 5x - 3$

$$x = \frac{-5 \pm \sqrt{25 - 4(1)(-3)}}{2(1)}$$

$$x = \frac{-5 \pm \sqrt{37}}{2} = \frac{-5 \pm \sqrt{37}}{2}$$

Find the type and number of solutions for each equation.

21. $x^2 - 3x = -8$

$$x^2 - 3x + 8 = 0$$

$$9 - 4(1)(8) = -23$$

2 Imaginary

22. $x^2 + 4x = -3$

$$x^2 + 4x + 3 = 0$$

$$16 - 4(1)(3) = 4$$

2 Real

23. $2x^2 - 12x = -18$

$$2x^2 - 12x + 18 = 0$$

$$144 - 4(2)(18) = 0$$

1 Real

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