

Find all the **Rational Zeros** for each polynomial function. Show all work on separate sheets of paper. Number each problem and show all work required for a solution.

1. $f(x) = 2x^4 + x^3 - 19x^2 - 9x + 9$

2. $f(x) = 4x^4 + 13x^3 - 49x^2 - 73x - 15$

3. $f(x) = 2x^4 + x^3 - 14x^2 + 5x + 6$

4. $f(x) = 4x^5 - 27x^3 - 25x^2 - 6x$

5. $f(x) = x^5 - 5x^4 + 5x^3 + 5x^2 - 6x$

6. $f(x) = x^5 - 3x^4 - 5x^3 + 15x^2 + 4x - 12$

7. $f(x) = 4x^5 - 8x^4 - 19x^3 + 41x^2 + 12x - 36$

8. $f(x) = 4x^5 - 8x^4 - 25x^3 + 32x^2 + 27x - 18$

Find all the **Real Zeros** for each polynomial function.

9. $f(x) = x^3 - 2x^2 - 5x + 10$

10. $f(x) = x^4 + 3x^3 - x^2 - 9x - 6$

11. $f(x) = 2x^5 - 3x^4 - 6x^3 + 9x^2 + 4x - 6$ with 1, -1 and 3/2 as roots

12. $f(x) = x^4 - x^3 - 13x^2 + 7x + 42$ with 3 and -2 as roots

13. $f(x) = x^4 + 2x^3 - 13x^2 - 8x + 6$ with 3 and -1 as roots

14. $f(x) = 3x^4 + 12x^3 - 16x^2 - 4x + 5$ with -5 as a root

Find all the **Real and/or Complex Zeros** for each polynomial function.

15. $f(x) = 2x^4 + 5x^3 + 5x^2 + 20x - 12$ with -3 and $1/2$ as zeros

16. $f(x) = 3x^4 + 5x^3 + 25x^2 + 45x - 18$ with -2 and $1/3$ as zeros

17. $f(x) = x^4 - 7x^3 + 14x^2 - 38x - 60$ with 6 and -1 as zeros

18. $f(x) = 2x^5 - 3x^4 - 5x^3 - 15x^2 - 207x + 108$ with 4 and $1/2$ as zeros

19. $f(x) = x^5 + x^4 - 16x - 16$ $2, -2, -1, \pm 2i$

20. $f(x) = x^4 + 2x^3 - 8x - 16$ $2, -2, -1 \pm i\sqrt{3}$

Answers

1. 3, -3, -1, 1/2 2. -5, -1, 3, -1/4 3. -3, 1, 2, -1/2

9. $f(x) = x^3 - 2x^2 - 5x + 10$ 2, $\pm\sqrt{5}$

10. $f(x) = x^4 + 3x^3 - x^2 - 9x - 6$ -1, -2, $\pm\sqrt{3}$

11. $f(x) = 2x^5 - 3x^4 - 6x^3 + 9x^2 + 4x - 6$ 1, -1, 3/2, $\pm\sqrt{2}$

12. $f(x) = x^4 - x^3 - 13x^2 + 7x + 42$ 3, -2, $\pm\sqrt{7}$

13. $f(x) = x^4 + 2x^3 - 13x^2 - 8x + 6$ 3, -1, $-2 \pm \sqrt{6}$

14. $f(x) = 3x^4 + 12x^3 - 16x^2 - 4x + 5$ -5, 1, $\pm\frac{\sqrt{3}}{3}$

15. $f(x) = 2x^4 + 5x^3 + 5x^2 + 20x - 12$ with -3 and 1/2 as zeros

16. $f(x) = 3x^4 + 5x^3 + 25x^2 + 45x - 18$ with -2 and 1/3 as zeros

17. $f(x) = x^4 - 7x^3 + 14x^2 - 38x - 60$ with 6 and -1 as zeros

18. $f(x) = 2x^5 - 3x^4 - 5x^3 - 15x^2 - 207x + 108$ with 4 and 1/2 as zeros

19. $f(x) = x^5 + x^4 - 16x - 16$ 2, -2, -1, $\pm 2i$

20. $f(x) = x^4 + 2x^3 - 8x - 16$ 2, -2, $-1 \pm i\sqrt{3}$