

Synthetic Division

Use synthetic Division to perform each division.

1. $\frac{x^3+3x^2+11x+9}{x+1}$

2. $\frac{x^3+7x^2+13x+6}{x+2}$

3. $\frac{2x^4-x^3-7x^2+7x-10}{x-2}$

4. $\frac{3x^4+x^3-3x^2+x-6}{x-4}$

5. $\frac{x^4-2x^2+7x-3}{x+3}$

6. $\frac{x^4-5x^2+2x-4}{x+5}$

7. $\frac{x^4-1}{x-1}$

8. $\frac{x^5+1}{x+1}$

Use synthetic division to express $f(x)$ in the form $f(x) = (x - k)q(x) + r$ for the given value of k

9. $f(x) = 2x^3 + x^2 + x - 8$ for $k = -1$

10. $f(x) = 2x^3 + 3x^2 - 16x + 10$ for $k = -4$

11. $f(x) = 4x^4 - 3x^3 - 20x^2 - x - 5$ for $k = 3$

12. $f(x) = -5x^4 + x^3 + 2x^2 + 3x + 1$ for $k = 1$

13. $f(x) = x^4 - 3x + 5$ for $k = 1$

14. $f(x) = x^4 - 2x - 3$ for $k = 2$

For each polynomial function, use the Remainder Theorem and synthetic division to determine the value of $f(k)$. Also, indicate whether $f(k)$ is a zero for the function polynomial function.

15. $f(x) = x^2 + 2x - 8$ and $k = 2$

16. $f(x) = x^2 + 4x - 5$ for $k = -5$

17. $f(x) = x^3 - 3x^2 + 4x - 4$ for $k = 2$

18. $f(x) = x^3 + 2x^2 - x + 6$ for $k = -3$

19. $f(x) = 2x^3 - 6x^2 - 9x + 4$ for $k = 1$

$$20. f(x) = 2x^3 + 9x^2 - 16x + 12 \text{ for } k = 1$$

$$21. f(x) = 4x^4 + x^2 + 17x + 3 \text{ for } k = -\frac{3}{2}$$

$$22. f(x) = 3x^4 + 13x^3 - 10x + 8 \text{ for } k = -\frac{4}{3}$$

$$23. f(x) = 5x^4 + 2x^3 - x + 3 \text{ for } k = \frac{2}{5}$$

$$24. f(x) = 16x^4 + 3x^2 - 2 \text{ for } k = \frac{1}{2}$$

Use synthetic division to determine whether $x - k$ is a factor for the polynomial function $f(x)$.

$$25. f(x) = x^3 - 5x^2 + 3x + 1 ; x - 1$$

$$26. f(x) = x^3 + 6x^2 - 2x - 7 ; x + 1$$

$$27. f(x) = 2x^4 + 5x^3 - 8x^2 + 3x + 13 ; x + 1$$

$$28. f(x) = -3x^4 + x^3 - 5x^2 + 2x + 4 ; x - 1$$

$$29. f(x) = -x^3 + 3x - 2 ; x + 2$$

$$30. f(x) = -2x^3 + x^2 - 63 ; x + 3$$

$$31. f(x) = 2x^4 + 5x^3 - 2x^2 + 5x + 6 ; x + 3$$

$$32. f(x) = 5x^4 + 16x^3 - 15x^2 + 8x + 16 ; x + 4$$

Factor each polynomial function, one zero is given. Determine all the other zeros.

$$33. f(x) = x^3 - 2x^2 - 5x + 6 ; 3$$

$$34. f(x) = x^3 + 4x^2 - 5 ; 1$$

$$35. f(x) = x^3 - 2x^2 - 13x - 10 ; 5$$

$$36. f(x) = x^3 + 5x^2 + 2x - 8 ; 1$$

37. $f(x) = x^3 + 6x^2 - x - 30; -3$

38. $f(x) = x^3 - x^2 - 10x - 8; -2$

39. $f(x) = 6x^3 + 17x^2 - 31x - 12; -4$

40. $f(x) = 15x^3 + 61x^2 + 2x - 8; -4$