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Divide using synthetic division.

1. $(2x^4 - 11x^3 + 15x^2 + 6x - 18) \div (x - 3)$

2. $(2x^4 - x^3 + 4) \div (x + 1)$

A polynomial $f(x)$ and a factor of $f(x)$ are given. Factor $f(x)$ completely.

3. $f(x) = x^3 + 9x^2 - 37x - 165; \; x - 5$

4. $f(x) = 4x^3 + 8x^2 - 25x - 50; \; x + 2$

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

6. $f(x) = 4x^4 + 26x^3 - 8x^2 + 39x - 21; \; x + 7$

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

8. $f(x) = 6x^5 - 38x^4 + 12x^3 - 15x^2 + 95x - 30;$
   $x - 6$

A polynomial $f(x)$ and one zero of $f(x)$ are given. Factor completely and find all the zeros of $f(x)$.

9. $f(x) = x^3 - 10x^2 - 3x + 108; \; 4$

10. $f(x) = 9x^3 + 45x^2 - 4x - 20; \; -5$

11. $f(x) = 12x^3 + 8x^2 - 13x + 3; \; \dfrac{1}{2}$

12. $f(x) = x^3 + x^2 - 13x + 3; \; 3$

13. $f(x) = 2x^3 + 11x^2 + 9x + 2; \; -\dfrac{1}{2}$

14. $f(x) = x^3 + x^2 + 2x + 24; \; -3$

Find the value of k such that the denominator divides evenly into the numerator.

15. $\dfrac{x^3 + 4x^2 + kx - 10}{x - 5}$

16. $\dfrac{x^5 - 2x^3 + kx^2 - 8}{x + 2}$

17. Show that $(x - 2)$ and $(x + 3)$ are factors of $f(x) = 2x^4 + 7x^3 - 4x^2 - 27x - 18$. Then find the remaining factors of $f(x)$.

18. Show that $(x + 2)$ and $(x - 4)$ are factors of $f(x) = 8x^4 - 14x^3 - 71x^2 - 10x + 24$. Then find the remaining factors of $f(x)$.