

MPS 21 HOMEWORK SHEET 2

In Exercises 1–14, divide by long division.

Dividend	Divisor
1. $2x^2 + 10x + 12$	$x + 3$
2. $5x^2 - 17x - 12$	$x - 4$
3. $4x^3 - 7x^2 - 11x + 5$	$4x + 5$
4. $6x^3 - 16x^2 + 17x - 6$	$3x - 2$
5. $x^4 + 5x^3 + 6x^2 - x - 2$	$x + 2$
6. $x^3 + 4x^2 - 3x - 12$	$x^2 - 3$
7. $7x + 3$	$x + 2$
8. $8x - 5$	$2x + 1$
9. $6x^3 + 10x^2 + x + 8$	$2x^2 + 1$
10. $x^3 - 9$	$x^2 + 1$
11. $x^4 + 3x^2 + 1$	$x^2 - 2x + 3$
12. $x^5 + 7$	$x^3 - 1$
13. $2x^3 - 4x^2 - 15x + 5$	$(x - 1)^2$
14. x^4	$(x - 1)^3$

In Exercises 15–32, divide by synthetic division.

Dividend	Divisor
15. $3x^3 - 17x^2 + 15x - 25$	$x - 5$
16. $5x^3 + 18x^2 + 7x - 6$	$x + 3$
17. $4x^3 - 9x + 8x^2 - 18$	$x + 2$
18. $9x^3 - 16x - 18x^2 + 32$	$x - 2$

38. $x^3 - x^2 - 13x - 3 = 0$, $x = 2 - \sqrt{5}$
 39. $x^3 + 3x^2 - 3x - 1$, $x = -2 - \sqrt{3}$
 40. $x^3 + 2x^2 - 2x - 4$, $x = \sqrt{2}$

In Exercises 41–44, express the function in the form $f(x) = (x - k)q(x) + r$ for the given value of k , and demonstrate that $f(k) = r$.

41. $f(x) = x^3 - x^2 - 14x + 11$, $k = 4$
 42. $f(x) = \frac{1}{3}(15x^4 + 10x^3 - 6x^2 + 17x + 14)$, $k = -\frac{2}{3}$
 43. $f(x) = x^3 + 3x^2 - 2x - 14$, $k = \sqrt{2}$
 44. $f(x) = 4x^3 - 6x^2 - 12x - 4$, $k = 1 - \sqrt{3}$

In Exercises 45–50, use synthetic division to find the required function values.

45. $f(x) = 4x^3 - 13x + 10$
 (a) $f(1)$ (b) $f(-2)$
 (c) $f(\frac{1}{2})$ (d) $f(8)$
46. $g(x) = x^6 - 4x^4 + 3x^2 + 2$
 (a) $g(2)$ (b) $g(-4)$
 (c) $g(3)$ (d) $g(-1)$
47. $h(x) = 3x^3 + 5x^2 - 10x + 1$
 (a) $h(3)$ (b) $h(\frac{1}{3})$
 (c) $h(-2)$ (d) $h(-5)$

Dividend	Divisor
19. $-x^3 + 75x - 250$	$x + 10$
20. $3x^3 - 16x^2 - 72$	$x - 6$
21. $5x^3 - 6x^2 + 8$	$x - 4$
22. $5x^3 + 6x + 8$	$x + 2$
23. $10x^4 - 50x^3 - 800$	$x - 6$
24. $x^5 - 13x^4 - 120x + 80$	$x + 3$
25. $x^3 + 512$	$x + 8$
26. $5x^3$	$x + 3$
27. $-3x^4$	$x - 2$
28. $-3x^4$	$x + 2$
29. $5 - 3x + 2x^2 - x^3$	$x + 1$
30. $180x - x^4$	$x - 6$
31. $4x^3 + 16x^2 - 23x - 15$	$x + \frac{1}{2}$
32. $3x^3 - 4x^2 + 5$	$x - \frac{3}{2}$

In Exercises 33–40, use synthetic division to show that x is a solution of the third-degree polynomial equation, and use the result to factor the polynomial completely.

33. $x^3 - 7x + 6 = 0$, $x = 2$
 34. $x^3 - 28x - 48 = 0$, $x = -4$
 35. $2x^3 - 15x^2 + 27x - 10 = 0$, $x = \frac{1}{2}$
 36. $48x^3 - 80x^2 + 41x - 6 = 0$, $x = \frac{2}{3}$
 37. $x^3 - 3x^2 + 2 = 0$, $x = 1 + \sqrt{3}$

48. $f(x) = 0.4x^4 - 1.6x^3 + 0.7x^2 - 2$
 (a) $f(1)$ (b) $f(-2)$
 (c) $f(5)$ (d) $f(-10)$
49. $f(x) = x^3 - 2x^2 - 11x + 52$
 (a) $f(5)$ (b) $f(-4)$
 (c) $f(1.2)$ (d) $f(2)$
50. $g(x) = x^3 - x^2 + 25x - 25$
 (a) $g(5)$ (b) $g(\frac{1}{3})$
 (c) $g(-1.5)$ (d) $g(-1)$

In Exercises 51–54, use Horner's Method to find the required function values.

51. $f(x) = x^3 - 6x^2 + 12x - 8$
 (a) $f(5)$ (b) $f(-4.5)$
52. $f(x) = 3x^4 + 6x^3 - 10x^2 - 7x + 2$
 (a) $f(-4.8)$ (b) $f(0.02)$
53. $f(x) = -5x^4 + 8.5x^3 + 10x - 3$
 (a) $f(1.08)$ (b) $f(-5.4)$
54. $f(x) = -2x^5 + 4x^3 - 6x^2 + 10$
 (a) $f(4)$ (b) $f(-3.7)$