

1–20. Find (*without* using a calculator) the absolute extreme values of each function on the given interval.

✓ 1. $f(x) = x^3 - 6x^2 + 9x + 8$ on $[-1, 2]$

2. $f(x) = x^3 - 6x^2 + 22$ on $[-2, 2]$

3. $f(x) = x^3 - 12x$ on $[-3, 3]$

4. $f(x) = x^3 - 27x$ on $[-2, 2]$

5. $f(x) = x^4 + 4x^3 + 4x^2$ on $[-2, 1]$

6. $f(x) = x^4 - 4x^3 + 4x^2$ on $[0, 3]$

7. $f(x) = x^4 + 4x^3 + 15$ on $[-4, 1]$

8. $f(x) = 2x^4 - 8x^3 + 30$ on $[-1, 4]$

9. $f(x) = 2x^5 - 5x^4$ on $[-1, 3]$

10. $f(x) = 4x^5 - 5x^4$ on $[0, 2]$

11. $f(x) = 3x^2 - x^3$ on $[0, 5]$

12. $f(x) = 6x^2 - x^3$ on $[0, 5]$

13. $f(x) = 5 - x$ on $[0, 5]$

14. $f(x) = x(100 - x)$ on $[0, 100]$

15. $f(x) = x^2(3 - x)$ on $[-1, 3]$

16. $f(x) = x^3(4 - x)$ on $[-1, 4]$

17. $f(x) = (x^2 - 1)^2$ on $[-1, 1]$

18. $f(x) = \sqrt[3]{x^2}$ on $[-1, 8]$

✓ 19. $f(x) = \frac{x}{x^2 + 1}$ on $[-3, 3]$

20. $f(x) = \frac{1}{x^2 + 1}$ on $[-3, 3]$