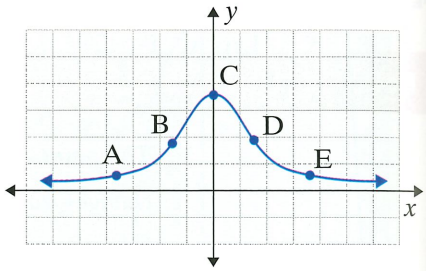
4.1 Exercises

1. At each point marked on the graph in the figure, determine if f' is positive, negative, or zero. Determine if f'' is positive, negative or zero.



Draw a graph which satisfies the given conditions in Exercises 2 – 5.

2. Given $f(5) = 9,\ f'(5) = 2,\ f''(5) = -2.$

3. Given $f(-5) = -9,\ f'(-5) = 2,\ f''(-5) = 2.$

4. Given $f(5) = -9,\ f'(5) = 0,\ f''(5) = 3.$

5. Given $f(0) = 12,\ f'(0) = 0,\ f''(0) = -3.$

Find both the first and second derivatives for each of the functions in Exercises 6 – 17. Locate any relative maximum or minimum points and any points of inflection. Determine the intervals on which the function is concave upwards or concave downwards.

6. $f(x) = 7x^2 - 28x + 8$

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

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

9. $f(x) = 3x^3 + 6x - 8$

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

11. $f(x) = x^4 - 3\sqrt{x} + 2$

12. $f(x) = \left(x^2 + 7\right)^2$

13. $f(x) = \left(2x^2 - 5\right)^2$

14. $f(x) = \sqrt{x^2 + 3}$

15. $f(x) = \sqrt[3]{x^2 + 9}$

16. $f(x) = \dfrac{3x}{x^2 + 1}$

17. $f(x) = \dfrac{2x + 1}{x^2 - 4}$