Differentiation 1

Practice Problems

Differentiate each of the following functions.   Assume that a, b, and c are constants.

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

2. $f(x) = ax^2 + bx + c$

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

4. $f(x) = \sqrt[5]{x^2}$

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

6. $f(x) = x^2 - \dfrac{1}{x^2}$

7. $f(x) = -\dfrac{2}{3}(x^7 + 2x - 15)$

8. $f(x) = \sqrt{x^7} - \dfrac{1}{x^7} - e^7$

9. $f(x) = \dfrac{(x+5)^3 + (x-5)^3}{2}$

10. $f(x) = 3\pi^5 - 3\pi + 5$

11. $f(x) = \dfrac{(x+5)^3 - (x-5)^3}{2}$

12. $f(x) = \sqrt[7]{x^3} + \sqrt[3]{x^7}$

13. $f(x) = x^{10} + \sqrt[10]{x} + \dfrac{1}{\sqrt[10]{x}} + \dfrac{1}{x^{10}}$

14. $f(x) = 3x^8 - 4x^5 + x^2 - 6$

15. $f(x) = -\dfrac{1}{x^2}(2x^3 + 4)$

16. $f(x) = x^a + \sqrt[b]{x}$

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

18. $f(x) = 5x^4 - \pi^2 + 3x - \dfrac{1}{e}$

19. $f(x) = \dfrac{3}{x} - x + (x-e)^2$

20. $f(x) = \pi x^2 - e^3 - \dfrac{5x}{\sqrt[3]{x^2}}$

21. Find a function $f(x)$ so that

    a) $f'(x) = 6x$ b) $f'(x) = x^2 + x$ c) $f'(x) = \dfrac{1}{x^5}$

Practice Problems - Answers

1. $f'(x) = 6x - 5$

2. $f'(x) = 2ax + b$

3. $f'(x) = -\dfrac{3}{x^4}$

4. $f'(x) = \dfrac{2}{5}x^{-3/5} = \dfrac{2}{5\sqrt[5]{x^3}} = \dfrac{2}{5x}\sqrt[5]{x^2}$

5. $f'(x) = -2x - 2$

6. $f'(x) = 2x + \dfrac{2}{x^3}$

7. $f'(x) = -\dfrac{14}{3}x^6 - \dfrac{4}{3}$

8. $f'(x) = \dfrac{7}{2}x^{5/2} + 7x^{-8}$

9. $f'(x) = 3x^2 + 75$

10. $f'(x) = 0$

11. $f'(x) = 30x$

12. $f'(x) = \dfrac{3}{7}x^{-4/7} + \dfrac{7}{3}x^{4/3}$

13. $f'(x) = 10x^9 + \dfrac{1}{10\sqrt[10]{x^9}} - \dfrac{1}{10x\sqrt[10]{x}} - \dfrac{10}{x^{11}}$

14. $f'(x) = 24x^7 - 20x^4 + 2x$

15. $f'(x) = -2 + \dfrac{8}{x^3}$

16. $f'(x) = ax^{a-1} + \dfrac{1}{b}\dfrac{\sqrt[b]{x}}{x}$

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

18. $f'(x) = 20x^3 + 3$

19. $f'(x) = 2x - 2e - 1 - \dfrac{3}{x^2}$

20. $f'(x) = 2\pi x - \dfrac{5}{3\sqrt[3]{x^2}}$

21. a) $f(x) = 3x^2$ b) $f(x) = \dfrac{1}{3}x^3 + \dfrac{1}{2}x^2$ c) $f(x) = -\dfrac{1}{4x^4}$

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