

Practice Problems

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

1. $f(x) = \sin(x^2 - 1)$

11. $f(x) = \frac{3 - 2x}{3 + 2x}$

2. $f(x) = \frac{x^5 - 3x^2 + 19}{2x}$

12. $f(x) = (\sin(3x) - \cos(5x))^4$

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

13. $f(x) = \frac{x^2 + 6x + 5}{x + 1}$

4. $f(x) = \sin(\tan x)$

14. $f(x) = (\sin 3x) \cdot (\cos 5x)$

5. $f(x) = \frac{x + 7}{x - 7}$

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

6. $f(x) = \sin(15 - x)$

16. $f(x) = (\sin x - \cos x)^2$

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

17. $f(x) = \frac{ax + b}{bx + c}$

8. $f(x) = \frac{a}{b + \sqrt{x}}$

18. $f(x) = \tan(2009x)$

9. $f(x) = \cos(\cos x)$

19. $f(x) = \cot x$

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

20. $f(x) = \frac{\sin x + 1}{\cos x + 1}$

Practice Problems - Answers

1. $f'(x) = 2x \cos(x^2 - 1)$

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

3. $f'(x) = \frac{2x^2 + 2x}{(2x + 1)^2}$

4. $f'(x) = \frac{\cos(\tan x)}{\cos^2 x}$

5. $f'(x) = -\frac{14}{(x - 7)^2}$

6. $f'(x) = -\cos(15 - x)$

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

8. $f'(x) = -\frac{a}{2\sqrt{x}(b + \sqrt{x})^2}$

9. $f'(x) = \sin(\cos x) \cdot \sin x$

10. $f'(x) = 0$

11. $f'(x) = -\frac{12}{(2x + 3)^2}$

12. $f'(x) = 4(\sin 3x - \cos 5x)^3(3 \cos 3x + 5 \sin 5x)$

13. $f'(x) = 1$

14. $f'(x) = 3 \cos 3x \cos 5x - 5 \sin 3x \sin 5x$

15. $f'(x) = 4x - \frac{4}{x^2} + \frac{8}{x^3} - 2$

16. $f'(x) = 2 \sin^2 x - 2 \cos^2 x \quad \text{or} \quad -2 \cos 2x$

17. $f'(x) = \frac{ac - b^2}{(bx + c)^2}$

18. $f'(x) = \frac{2009}{\cos^2 2009x} = 2009(\tan^2 2009x + 1)$

19. $f'(x) = -\cot^2 x - 1$

20. $f'(x) = \frac{1 + \sin x + \cos x}{(1 + \cos x)^2}$