

**DEPARTMENT OF MATHEMATICS**

## Differentiation Practice problems

Dr. Firoz

Find the derivative  $\left(\frac{dy}{dx}\right)$  of each of the following functions.

1.  $y = 5x^2 - 5\sqrt{x} - \frac{3}{x}$

2.  $y = (17x^2 - 5x)^{50}$

3.  $y = x^2 \cdot 2^x + \pi^2$

4.  $y = \cos^3(\sqrt{x})$

5.  $y = \frac{\tan x}{x^2 - 1}$

6.  $y = (\sin x)e^{x^2}$

7.  $y = \sqrt[5]{(3x + 2)^4}$

8.  $y = \frac{4}{3} \cdot 3^{x^2 - x}$

9.  $y = \frac{1}{2} \cdot \ln(x^2 - x)$

10.  $y = \frac{\sin(2x)}{\cos(2x)}$

11.  $y = x^2 \tan\left(\frac{1}{x}\right)$

12.  $2xy + y^2 = x + y$

13.  $y = \frac{\sqrt{x}}{\sqrt{x} - 1}$

14.  $y = \left(\frac{\cos x}{1 - \sin x}\right)^3$

15.  $y = \sin^3(3x^2 - 2x + 1)$

16.  $y = (1 + x^2)\tan^{-1} x$

17.  $y = \sin(\sqrt{x})$

18.  $y = \sqrt{\sin(x)}$

19.  $y = (ax)\tan(bx)$  ( $a$  and  $b$  constant)

20.  $y = \frac{2}{\sqrt{1-x^2}}$

21.  $y = \sin^{-1}(3x^2)$

22.  $y = \ln(\cos(x))$

23.  $y = \ln(x) \cdot \cos(x)$

24.  $y = x(\ln(x) - x)$

25.  $y = 3 \cdot 2^{x+1}$

26.  $y = mx + b$  ( $m$  and  $b$  constant)

27.  $y = (\cos^{-1}(x))^3$

28.  $y = \tan^{-1}(e^x)$

29.  $y = \ln\left((3x+1)\sqrt[2]{7x+4}\right)$

30.  $y = \ln\left(\frac{(2x-3)^2}{\sqrt{7x-5}}\right)$

31.  $y = e^{3x} \cos(\sqrt{x})$

32.  $y = \ln(\ln(x)) + e^2$

33.  $y = \frac{1}{1-e^{-x}}$

34.  $y = \frac{e^x}{x}$

35.  $y = x^x$

36.  $y = (\sin x)^{\cos x}$

37.  $y = 6 \cdot x^{-\frac{3}{2}} + 7 \cdot x^{\frac{1}{5}} + 1$

38.  $y = 3 \cos(5x) + 3 \sin(x^9)$

39.  $y = 5^{\sqrt{x}} + 3x^7$

40.  $y = \tan(6x)$

41.  $y = \tan^{-1}(6x)$

42.  $y = \sqrt{2x} + \frac{1}{x^2} + \pi$

43.  $y = 2 \cos^{-1} x - 4 \sec^{-1} x$

44.  $y = 2^x + 3 \ln(x)$

45.  $y = \tan(3)e^x$

46.  $y = \frac{\sin^2 x + \cos^2 x}{x}$

47.  $y = \frac{\sin x}{x^2}$

48.  $y = \tan(\sin x) + \pi^2$

49.  $2y = x^2 + \sin y$

50.  $y = e^{2x} \sin(3x)$