

Find the derivative of each of the following:

1.  $y = x^7$

2.  $y = x^{-3}$

3.  $y = 12x^6$

4.  $y = 5x^{-2}$

5.  $f(x) = x^\pi$

6.  $y = \pi^3$

7.  $y = 3^\pi$

8.  $g(t) = t^{\frac{1}{3}}$

9.  $h(x) = \sqrt{x}$

10.  $y = \frac{1}{x}$

11.  $f(x) = 7x^8$

12.  $g(x) = \frac{7}{x^8}$

13.  $h(x) = \frac{1}{7x^8}$

14.  $i(x) = \frac{x^8}{7}$

15.  $y = -3x^4$

16.  $y = \frac{-3}{x^4}$

17.  $y = \frac{1}{-3x^4}$

18.  $y = \frac{x^4}{-3}$

19.  $y = \frac{1}{3x^2}$

20.  $f(x) = (3x^2)^2$

21.  $g(x) = (5x)^{-3}$

22.  $y = (2x)^3$

23.  $h(w) = \frac{7}{w^5}$

24.  $f(x) = \frac{3}{\sqrt{x}}$

25.  $y = \left(\frac{2}{3}x\right)^{-3}$

26.  $y = \left(\frac{2}{3x}\right)^{-3}$

27.  $g(x) = \frac{x^2}{\sqrt{x}}$

28.  $h(t) = \sqrt{3t}$

29.  $g(w) = \sqrt[3]{w}$

30.  $f(y) = \sqrt[4]{y^7}$

31.  $y = \frac{x^2}{x^5}$

32.  $y = \frac{3x^7}{2x^4}$

33.  $f(t) = \frac{2t^3}{5t^7}$

34.  $y = \frac{\sqrt[3]{x}}{\sqrt[5]{x}}$

35.  $g(x) = (4x)^{-2}$

36.  $y = \sqrt[3]{x^4}$

37.  $y = \frac{1}{\sqrt[3]{x^5}}$

38.  $y = x^{\frac{1}{3}}$

39.  $y = \frac{1}{x^3}$

40.  $f(w) = w^{1023}$

Answers:

1.  $y' = 7x^6$

2.  $y' = -3x^{-2}$

3.  $y' = 72x^5$

4.  $y' = -10x^{-3}$

5.  $f'(x) = \pi x^{\pi-1}$

6.  $y' = 0$

7.  $y' = 0$

8.  $g'(t) = \left(\frac{1}{3}\right)t^{-\frac{2}{3}}$

9.  $h'(x) = \frac{1}{2}(x)^{-\frac{1}{2}} = \frac{1}{2\sqrt{x}}$

10.  $y' = -x^{-2} = \frac{-1}{x^2}$

11.  $f'(x) = 56x^7$

12.  $g'(x) = -56x^{-9} = -\frac{56}{x^9}$

13.  $h'(x) = -\frac{8}{7}x^{-9} = -\frac{8}{7x^9}$

14.  $i'(x) = \frac{8}{7}x^7$

15.  $y' = -12x^3$

16.  $y' = 12x^{-5} = \frac{12}{x^5}$

17.  $y' = \frac{4}{3}x^{-5} = \frac{4}{3x^5}$

18.  $y' = -\frac{4}{3}x^3$

19.  $= y' - \frac{2}{3}x^{-3} = -\frac{2}{3x^3}$

20.  $f'(x) = 36x^3$

21.  $g'(x) = -\frac{3}{125}x^{-4} = -\frac{1}{125x^4}$

22.  $y' = 24x^2$

23.  $h'(w) = -35w^{-6} = -\frac{35}{w^6}$

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

$= -\frac{3}{2x\sqrt{x}}$

25.  $y' = -\frac{81}{8}x^{-4} = -\frac{81}{8x^4}$

26.  $y' = \frac{81}{8}x^2$

27.  $g'(x) = \frac{3}{2}x^{\frac{1}{2}} = \frac{3\sqrt{x}}{2}$

28.  $h'(t) = \frac{\sqrt{3}}{2}t^{-\frac{1}{2}} = \frac{\sqrt{3}}{2\sqrt{t}}$

$= \frac{1}{2}\sqrt{\frac{3}{t}}$

29.  $g'(w) = \frac{1}{3}w^{-\frac{2}{3}} = \frac{1}{\sqrt[3]{w^2}}$

30.  $f'(y) = \frac{7}{4}y^{\frac{3}{4}} = \frac{7\sqrt[4]{y^3}}{4}$

31.  $y' = -\frac{3}{4x^4}$

32.  $y' = \frac{9x^2}{4}$

33.  $f'(t) = -\frac{8}{5t^5}$

34.  $y' = \frac{2}{15}x^{-\frac{13}{15}} = \frac{2}{15\sqrt[15]{x^{13}}}$

35.  $g'(x) = -\frac{1}{8x^3}$

36.  $y' = \frac{4}{3}x^{\frac{1}{3}} = \frac{4\sqrt[3]{x}}{3}$

$$37. \quad y' = -\frac{5}{3}x^{-\frac{8}{3}} = -\frac{5}{3\sqrt[3]{x^8}}$$

$$38. \quad y' = \frac{1}{3}x^{-\frac{2}{3}} = \frac{1}{3\sqrt[3]{x^2}}$$

$$39. \quad y' = -\frac{1}{3}x^{-\frac{4}{3}} = -\frac{1}{3\sqrt[3]{x^4}}$$

$$40. \quad f'(w) = 1023w^{1022}$$