

Answers to Worksheet 5 - Derivatives II

1) $\frac{dy}{dx} = -4x$

2) $\frac{dy}{dx} = 6x$

3)
$$\begin{aligned}\frac{dy}{dx} &= \frac{8}{3}x^3 - \frac{10}{3}x^{\frac{2}{3}} + \frac{2}{15}x^{-\frac{3}{5}} \\ &= \frac{8x^3}{3} - \frac{10x^{\frac{2}{3}}}{3} + \frac{2}{15x^{\frac{3}{5}}}\end{aligned}$$

4)
$$\begin{aligned}f'(x) &= \frac{25}{3}x^{\frac{2}{3}} - 8x^{-5} + \frac{5}{4}x^{-6} \\ &= \frac{25x^{\frac{2}{3}}}{3} - \frac{8}{x^5} + \frac{5}{4x^6}\end{aligned}$$

5)
$$\begin{aligned}f'(x) &= \frac{20}{3}x^4 - x^{-2} + \frac{5}{2}x^{-6} \\ &= \frac{20x^4}{3} - \frac{1}{x^2} + \frac{5}{2x^6}\end{aligned}$$

6)
$$\begin{aligned}\frac{dy}{dx} &= \frac{5}{3}x^4 - 16x^3 + x^2 \\ &= \frac{5x^4}{3} - 16x^3 + x^2\end{aligned}$$

7)
$$\begin{aligned}f'(x) &= \frac{16}{3}x^{\frac{1}{3}} - \frac{5}{12}x^{-\frac{2}{3}} + 10x^{-3} \\ &= \frac{16x^{\frac{1}{3}}}{3} - \frac{5}{12x^{\frac{2}{3}}} + \frac{10}{x^3}\end{aligned}$$

8)
$$\begin{aligned}f'(x) &= -\frac{4}{3}x^{\frac{2}{3}} - \frac{1}{2}x^{-\frac{1}{2}} - 4x^{-5} \\ &= -\frac{4x^{\frac{2}{3}}}{3} - \frac{1}{2x^{\frac{1}{2}}} - \frac{4}{x^5}\end{aligned}$$

9)
$$\begin{aligned}f'(x) &= 12x^3 - \frac{5}{16}x^{-\frac{3}{4}} + \frac{2}{5}x^{-\frac{4}{5}} \\ &= 12x^3 - \frac{5}{16x^{\frac{3}{4}}} + \frac{2}{5x^{\frac{4}{5}}}\end{aligned}$$

10)
$$\begin{aligned}f'(x) &= -8x^3 + 3 + \frac{1}{5}x^{-2} \\ &= -8x^3 + 3 + \frac{1}{5x^2}\end{aligned}$$

11)
$$\begin{aligned}f'(x) &= 2x - 5x^{-2} + 2x^{-6} \\ &= 2x - \frac{5}{x^2} + \frac{2}{x^6}\end{aligned}$$

12)
$$\begin{aligned}f'(x) &= -\frac{6}{5}x^2 - \frac{5}{4}x^{-\frac{1}{2}} + \frac{2}{25}x^{-\frac{3}{5}} \\ &= -\frac{6x^2}{5} - \frac{5}{4x^{\frac{1}{2}}} + \frac{2}{25x^{\frac{3}{5}}}\end{aligned}$$

13) $f'(x) = 4x + \cos x + \sin x$

14) $g'(x) = \frac{1}{x} - 2\sin x + \frac{2}{x^2}$

15) $g'(x) = 3\sin x + \frac{5}{x} - 5e^x - \frac{4}{x^3}$