

Exercise 3.2 # 1-19 odd, 23, 24

① $y = -x^2 + 3$ ③ $y = 5x^3 - 3x^5$ ⑤ $y = \frac{4}{3}x^3 - x$
 $y' = -2x$ $y' = 15x^2 - 15x^4$ $y' = 4x^2 - 1$

⑦ $y = 3x^{-2}$ ⑨ $y = -\frac{1}{x} = -x^{-1}$ ⑪ $y = 6x^2 - 10x - 5x^{-2}$
 $y' = -6x^{-3} = -\frac{6}{x^3}$ $y' = x^{-2} = \frac{1}{x^2}$ $y' = 12x - 10 + 10x^{-3}$
 $y' = 12x - 10 + \frac{10}{x^3}$

⑬ $y = \frac{1}{3}x^{-2} - \frac{5}{9}x^{-1}$ ⑮ $y = 9x + 1 + \frac{1}{x}$ ⑰ $y = (3x-1)(2x+5)$
 $y' = -\frac{2}{3}x^{-3} + \frac{5}{9}x^{-2}$ $y = 9x + 1 + x^{-1}$ $y' = 3(2x+5) + (3x-1) \cdot 2$
 $y' = -\frac{2}{3x^3} + \frac{5}{9x^2}$ $y' = 9 - 1x^{-2}$ $y' = 6x + 15 + 6x - 2$
 $y' = 9 - \frac{1}{x^2}$ $y' = 12x + 13$

⑲ $y = x^2(x^3-1)$ ⑳ $y = \frac{2x+5}{3x-2}$
 $y' = 2x(x^3-1) + x^2 \cdot 3x^2$ $y' = \frac{(3x-2) \cdot 2 + (2x+5) \cdot 3}{(3x-2)^2} = \frac{6x-4-6x-15}{(3x-2)^2}$
 $y' = 2x^4 - 2x + 3x^4$ $y' = \frac{-19}{(3x-2)^2}$
 $y' = 5x^4 - 2x$

㉑ $y = \frac{2x+1}{x^2-1}$
 $y' = \frac{(x^2-1) \cdot 2 - (2x+1) \cdot 2x}{(x^2-1)^2} = \frac{2x^2 - 2 - 4x^2 - 2x}{(x^2-1)^2} = \frac{-2x^2 - 2x - 2}{(x^2-1)^2}$

Exercise 3.4 #1-8

$$\textcircled{1} y = -10x + 3\cos(x)$$
$$y' = -10 - 3\sin(x)$$

$$\textcircled{2} y = 6x^2 - \sin(x)$$
$$y' = 12x - \cos(x)$$

$$\textcircled{3} y = 4 + 2x^{-1} - \cos(x)$$
$$y' = -2x^{-2} + \sin(x)$$
$$y' = -\frac{2}{x^2} + \sin(x)$$

$$\textcircled{4} y = 3x^{-1} + 5\sin(x)$$
$$y' = -3x^{-2} + 5\cos(x)$$
$$y' = -\frac{3}{x^2} + 5\cos(x)$$

$$\textcircled{5} y = \csc(x) - 4x^{1/2} + 7$$
$$y' = -\csc(x)\cot(x) - 2x^{-1/2}$$
$$y' = -\csc(x)\cot(x) - \frac{2}{x^{1/2}}$$

$$\textcircled{6} y = 3x(\sec(x) + 1)$$
$$y' = 3(\sec(x) + 1) + 3x(\sec(x)\tan(x))$$
$$y' = 3\sec(x) + 3 + 3x\sec(x)\tan(x)$$

$$\textcircled{7} y = x^2 \cot(x) - x^{-2}$$
$$y' = 2x \cot(x) + x^2 \cdot -\csc^2(x) + 2x^{-3}$$
$$y' = 2x \cot(x) - x^2 \csc^2(x) + 2/x^3$$

$$\textcircled{8} y = x \cdot \sin(x) + \cos(x)$$
$$y' = (1) \cdot \sin(x) + x \cdot \cos(x) - \sin(x)$$
$$y' = \cancel{\sin(x)} + x \cos(x) - \cancel{\sin(x)}$$
$$y' = x \cos(x)$$

Exercise 3.5 # 3-14

③ $y = \sin(3x+1)$ ④ $y = \sin(7-5x)$ ⑤ $y = \cos(-\frac{1}{3}x)$
 $y' = \cos(3x+1) \cdot 3$ $y' = \cos(7-5x) \cdot -5$ $y' = -\sin(-\frac{1}{3}x) \cdot -\frac{1}{3}$
 $y' = 3 \cos(3x+1)$ $y' = -5 \cos(7-5x)$ $y' = \frac{1}{3} \sin(-\frac{1}{3}x)$

⑥ $y = \cos(\sqrt{3}x)$ ⑦ $y = \tan(2x-x^3)$ ⑧ $y = \tan(10x-5)$
 $y' = -\sin(\sqrt{3}x) \cdot \sqrt{3}$ $y' = \sec^2(2x-x^3) \cdot (2-3x^2)$ $y' = \sec^2(10x-5) \cdot 10$
 $y' = -\sqrt{3} \cdot \sin(\sqrt{3}x)$ $y' = (2-3x^2) \cdot \sec^2(2x-x^3)$ $y' = 10 \cdot \sec^2(10x-5)$

⑨ $y = \sec(x^2+\sqrt{2})$ ⑩ $y = \sec(3-8x)$
 $y' = \sec(x^2+\sqrt{2}) \tan(x^2+\sqrt{2}) \cdot 2x$ $y' = \sec(3-8x) \tan(3-8x) \cdot -8$
 $y' = 2x \sec(x^2+\sqrt{2}) \tan(x^2+\sqrt{2})$ $y' = -8 \sec(3-8x) \tan(3-8x)$

⑪ $y = -\csc(x^2+7x)$ ⑫ $y = \frac{1}{3} \csc(1-2x)$
 $y' = -1 \cdot -\csc(x^2+7x) \cot(x^2+7x) \cdot (2x+7)$ $y' = -\frac{1}{3} \csc(1-2x) \cot(1-2x) \cdot -2$
 $y' = (2x+7) \csc(x^2+7x) \cot(x^2+7x)$ $y' = \csc(1-2x) \cot(1-2x)$

⑬ $y = 5 \cot(2x^{-1})$ ⑭ $y = \cot(\pi - x^{-1})$
 $y' = -5 \csc^2(2x^{-1}) \cdot -2x^{-2}$ $y' = -\csc^2(\pi - x^{-1}) \cdot x^{-2}$
 $y' = \frac{10 \csc^2(\frac{2}{x})}{x^2}$ $y' = \frac{-\csc^2(\pi - \frac{1}{x})}{x^2}$

Exercise 3.5 # 15-22

$$\begin{aligned} \textcircled{15} \quad y &= (2x+1)^5 \\ y' &= 5(2x+1)^4 \cdot 2 \\ y' &= 10(2x+1)^4 \end{aligned}$$

$$\begin{aligned} \textcircled{16} \quad y &= (4-3x)^9 \\ y' &= 9(4-3x)^8 \cdot -3 \\ y' &= -27(4-3x)^8 \end{aligned}$$

$$\begin{aligned} \textcircled{17} \quad y &= (x^2+1)^{-3} \\ y' &= -3(x^2+1)^{-4} \cdot 2x \\ y' &= \frac{-6x}{(x^2+1)^4} \end{aligned}$$

$$\begin{aligned} \textcircled{18} \quad y &= (x+x^3)^{-2} \\ y' &= -2(x+x^3)^{-3} \cdot (1+3x^2) \\ y' &= \frac{-2(1+3x^2)}{(x+x^3)^3} \end{aligned}$$

$$\begin{aligned} \textcircled{19} \quad y &= \frac{1}{5x-7} \\ y' &= \frac{(5x-7) \cdot 0 - 1(5)}{(5x-7)^2} = \frac{-5}{(5x-7)^2} \end{aligned}$$

$$\begin{aligned} \textcircled{20} \quad y &= \frac{2}{x^2+6} \\ y' &= \frac{(x^2+6) \cdot 0 - 2 \cdot 2x}{(x^2+6)^2} \\ y' &= \frac{-4x}{(x^2+6)^2} \end{aligned}$$

$$\begin{aligned} \textcircled{21} \quad y &= (1 - \frac{1}{7}x)^{-7} \\ y' &= -7(1 - \frac{1}{7}x)^{-8} \cdot -\frac{1}{7} \\ y' &= (1 - \frac{1}{7}x)^{-8} \\ y' &= \frac{1}{(1 - \frac{1}{7}x)^8} \end{aligned}$$

$$\begin{aligned} \textcircled{22} \quad y &= (\frac{1}{3}x - 1)^{-10} \\ y' &= -10(\frac{1}{3}x - 1)^{-11} \cdot \frac{1}{3} \\ y' &= -\frac{10}{3}(\frac{1}{3}x - 1)^{-11} \\ y' &= \frac{-10}{3(\frac{1}{3}x - 1)^{11}} \end{aligned}$$

Exercise 3.6 # 1-11 odd

$$\textcircled{1} \quad y = x^{3/4}$$
$$y' = \frac{3}{4} x^{-1/4}$$

$$\textcircled{3} \quad y = (2x)^{1/3}$$
$$y' = \frac{1}{3} (2x)^{-2/3} \cdot 2$$
$$y' = \frac{2}{3(2x)^{2/3}}$$

$$\textcircled{5} \quad y = 7(x+6)^{1/2}$$
$$y' = \frac{7}{2} (x+6)^{-1/2} (1)$$
$$y' = \frac{7}{2(x+6)^{1/2}}$$

$$\textcircled{7} \quad y = (2x+5)^{-1/2}$$
$$y' = -\frac{1}{2} (2x+5)^{-3/2} \cdot 2$$
$$y' = \frac{-1}{(2x+5)^{3/2}}$$

$$\textcircled{9} \quad y = x(x^2+1)^{1/2}$$
$$y' = 1(x^2+1)^{1/2} + x \cdot \frac{1}{2} (x^2+1)^{-1/2} \cdot 2x$$
$$y' = (x^2+1)^{1/2} + \frac{x^2}{(x^2+1)^{1/2}}$$

$$\textcircled{11} \quad y = 3(\csc(x))^{-3/2}$$
$$y' = -\frac{9}{2} (\csc(x))^{-5/2} \cdot (-\csc(x) \cot(x))$$
$$y' = \frac{9 \csc(x) \cot(x)}{2 (\csc(x))^{5/2}}$$
$$y' = \frac{9 \cot(x)}{2 (\csc(x))^{3/2}}$$