第１章 6 「対数関数の性質を用いた微分法」 第３回

解答

1. (1) $y' = \dfrac{2x+1}{(x-2)(x+3)}$

(2) $y' = \dfrac{24x+1}{(4x-1)(3x+1)}$

(3) $y' = \dfrac{5}{(x-2)(x+3)}$

(4) $y' = \dfrac{7}{(4x-1)(3x+1)}$

(5) $y' = \dfrac{7x+1}{(x+1)(x-1)}$

(6) $y' = \dfrac{x+7}{(x+1)(x-1)}$

(7) $y' = \dfrac{5x+3}{x(x+1)}$

(8) $y' = \dfrac{7x+12}{2x(x+2)}$

解説

1. (1) $y = \log(x-2) + \log(x+3)$

$$y' = \frac{1}{x-2} + \frac{1}{x+3}$$
$$= \frac{x+3}{(x-2)(x+3)} + \frac{x-2}{(x-2)(x+3)}$$
$$= \frac{2x+1}{(x-2)(x+3)}$$

(2) $y = \log(4x-1) + \log(3x+1)$

$$y' = \frac{4}{4x-1} + \frac{3}{3x+1}$$
$$= \frac{4(3x+1)}{(4x-1)(3x+1)} + \frac{3(4x-1)}{(4x-1)(3x+1)}$$
$$= \frac{24x+1}{(4x-1)(3x+1)}$$

(3) $y = \log(x-2) - \log(x+3)$

$$y' = \frac{1}{x-2} - \frac{1}{x+3}$$
$$= \frac{x+3}{(x-2)(x+3)} - \frac{x-2}{(x-2)(x+3)}$$
$$= \frac{5}{(x-2)(x+3)}$$

(4) $y = \log(4x-1) - \log(3x+1)$

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

(5) $y = 3\log(x+1) + 4\log(x-1)$

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

(6) $y = 4\log(x-1) - 3\log(x+1)$

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

(7) $y = 3\log x + 2\log(x+1)$

$$y' = 3 \cdot \frac{1}{x} + 2 \cdot \frac{1}{x+1}$$
$$= \frac{3(x+1)}{x(x+1)} + \frac{2x}{x(x+1)}$$
$$= \frac{5x+3}{x(x+1)}$$

(8) $y = 3\log x + \dfrac{1}{2}\log(x+2)$

$$y' = 3 \cdot \frac{1}{x} + \frac{1}{2} \cdot \frac{1}{x+2}$$
$$= \frac{6(x+2)}{2x(x+2)} + \frac{x}{2x(x+2)}$$
$$= \frac{7x+12}{2x(x+2)}$$