第１章 6 「対数関数の性質を用いた微分法」 第１回

解答

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

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

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

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

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

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

(3) $y' = \dfrac{6x}{(2x-1)(x+1)}$

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

解説

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

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

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

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

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

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

(3) $y' = \dfrac{2}{2x-1} + 2 \cdot \dfrac{1}{x+1}$
$= \dfrac{2(x+1)}{(2x-1)(x+1)} + \dfrac{2(2x-1)}{(2x-1)(x+1)}$
$= \dfrac{6x}{(2x-1)(x+1)}$

(4) $y' = 4 \cdot \dfrac{1}{x-1} - 3 \cdot \dfrac{2}{2x-1}$
$= \dfrac{4(2x-1)}{(x-1)(2x-1)} - \dfrac{6(x-1)}{(x-1)(2x-1)}$
$= \dfrac{2x+2}{(x-1)(2x-1)} = \dfrac{2(x+1)}{(x-1)(2x-1)}$