

問題

問題 1. 次の関数を微分せよ。

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

(2) $y = \log 4x$

(3) $y = \log_5 5x$

(4) $y = \log_3(2x - 1)$

(5) $y = \log(x^2 + 2)$

(6) $y = \log_2(x^3 + 1)$

(7) $y = x^2 \log_2 x$

(8) $y = (x + 1) \log(x + 1)$

問題 2. 次の関数を微分せよ。

(1) $y = \log |2 \sin x + 1|$

(2) $y = \log |4 \cos x - 3|$

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

(4) $y = \log_2 |3x - 1|$

(5) $y = \log_3 |x^2 - 2|$

(6) $y = \log |x^3 - 4|$

問題 3. $\log |y|$ の導関数を利用して, 次の関数を微分せよ。

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

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

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

(4) $y = \frac{\sqrt{x - 1}}{x + 2}$

問題 4. 次の関数を微分せよ。

(1) $y = e^{5x}$

(2) $y = e^{-2x}$

(3) $y = e^{-2x^2}$

(4) $y = e^{\frac{1}{2}x^2}$

(5) $y = 5^x$

(6) $y = 7^x$

(7) $y = 2^{3x}$

(8) $y = 6^{-4x}$

(9) $y = x \cdot 3^x$

(10) $y = (3x + 1)e^x$

練習

練習 1. 次の関数を微分せよ。

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

(2) $y = \log 6x$

(3) $y = \log_3 2x$

(4) $y = \log_6(5x + 1)$

(5) $y = \log(x^2 + 5)$

(6) $y = \log_2(x^3 + 2)$

(7) $y = x^3 \log_5 x$

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

練習 2. 次の関数を微分せよ。

(1) $y = \log |3 \cos x - 1|$

(2) $y = \log |4 \sin x + 1|$

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

(4) $y = \log_5 |6x - 5|$

(5) $y = \log_2 |x^3 - 5|$

(6) $y = \log |x^2 - 6|$

練習 3. $\log |y|$ の導関数を利用して, 次の関数を微分せよ。

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

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

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

(4) $y = \frac{\sqrt{x-4}}{x+1}$

練習 4. 次の関数を微分せよ。

(1) $y = e^{4x}$

(2) $y = e^{-3x}$

(3) $y = e^{-\frac{1}{2}x^2}$

(4) $y = e^{3x^2}$

(5) $y = 2^x$

(6) $y = 6^x$

(7) $y = 3^{5x}$

(8) $y = 7^{-x^2}$

(9) $y = x \cdot 5^x$

(10) $y = (2x - 3)e^x$

解答

問題 1.

$$(1) y' = \frac{3}{3x+5} \quad (2) y' = \frac{1}{x} \quad (3) y' = \frac{1}{x \log 5} \quad (4) y' = \frac{2}{(2x-1) \log 3}$$

$$(5) y' = \frac{2x}{x^2+2} \quad (6) y' = \frac{3x^2}{(x^3+1) \log 2} \quad (7) y' = 2x \log_2 x + \frac{x^2}{\log 2}$$

$$(8) y' = \log(x+1) + 1$$

問題 2.

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

$$(4) y' = \frac{3}{(3x-1) \log 2} \quad (5) y' = \frac{2x}{(x^2-2) \log 3} \quad (6) y' = \frac{3x^2}{x^3-4}$$

問題 3.

$$(1) y' = \frac{(x+1)(x^2-4x+7)}{(x-1)^3} \quad (2) y' = -\frac{3(x+6)(x+1)^2}{(x-4)^2(x+2)^3}$$

$$(3) y' = -\frac{x+7}{2(x-1)^2 \sqrt{x+3}} \quad (4) y' = -\frac{x-4}{2(x+2)^2 \sqrt{x-1}}$$

問題 4.

$$(1) y' = 5e^{5x} \quad (2) y' = -2e^{-2x} \quad (3) y' = -4xe^{-2x^2} \quad (4) y' = xe^{\frac{1}{2}x^2}$$
$$(5) y' = 5^x \log 5 \quad (6) y' = 7^x \log 7 \quad (7) y' = 3 \cdot 2^{3x} \log 2 \quad (8) y' = -4 \cdot 6^{-4x} \log 6$$
$$(9) y' = 3^x(1+x \log 3) \quad (10) y' = (3x+4)e^x$$

解答

練習 1.

$$(1) y' = \frac{4}{4x-1} \quad (2) y' = \frac{1}{x} \quad (3) y' = \frac{1}{x \log 3} \quad (4) y' = \frac{5}{(5x+1) \log 6}$$

$$(5) y' = \frac{2x}{x^2+5} \quad (6) y' = \frac{3x^2}{(x^3+2) \log 2} \quad (7) y' = 3x^2 \log_5 x + \frac{x^2}{\log 5}$$

$$(8) y' = 2 \log(x^2+1) + \frac{4x^2}{x^2+1}$$

練習 2.

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

$$(4) y' = \frac{6}{(6x-5) \log 5} \quad (5) y' = \frac{3x^2}{(x^3-5) \log 2} \quad (6) y' = \frac{2x}{x^2-6}$$

練習 3.

$$(1) y' = \frac{(x+3)(x^2-9x+4)}{(x-2)^3} \quad (2) y' = \frac{(11x-7)(x-2)^2}{(x-1)^2(x+3)^3}$$

$$(3) y' = -\frac{x+4}{2(x-2)^2 \sqrt{x+1}} \quad (4) y' = -\frac{x-9}{2(x+1)^2 \sqrt{x-4}}$$

練習 4.

$$(1) y' = 4e^{4x} \quad (2) y' = -3e^{-3x} \quad (3) y' = -xe^{-\frac{1}{2}x^2} \quad (4) y' = 6xe^{3x^2}$$

$$(5) y' = 2^x \log 2 \quad (6) y' = 6^x \log 6 \quad (7) y' = 5 \cdot 3^{5x} \log 3 \quad (8) y' = -2x \cdot 7^{-x^2} \log 7$$

$$(9) y' = 5^x(1+x \log 5) \quad (10) y' = (2x-1)e^x$$