

6-3 関数の微分①

1 次の関数を微分せよ。

- (1) $y = -2$ (2) $y = -3x^2 + 6x - 5$ (3) $y = x^3 - 5x^2 - 6$
 (4) $y = -2x^3 + 6x^2 + 4x$ (5) $y = 2x^4 - 4x^2 + 3$ (6) $y = -\frac{1}{2}x^5 + \frac{3}{4}x^3 - \frac{2}{5}x$
 (7) $y = (x-1)(3-2x)$ (8) $y = (x+3)^3$ (9) $y = (2x-3)^3$

(1) $y' = 0$ (2) $y' = -6x + 6$

(3) $y' = 3x^2 - 10x$ (4) $y' = -6x^2 + 12x + 4$

(5) $y' = 8x^3 - 8x$ (6) $y' = -\frac{5}{2}x^4 + \frac{9}{4}x^2 - \frac{2}{5}$

(7) $y = -2x^2 + 5x - 3$ (8) $y = x^3 + 9x^2 + 27x + 27$
 $y' = -4x + 5$ $y' = 3x^2 + 18x + 27$

(9) $y = 8x^3 - 36x^2 + 54x - 27$
 $y' = 24x^2 - 72x + 54$

2 次の関数を微分せよ。

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

(1) $y = x^3 - 2x^2 + x - 2$
 $y' = 3x^2 - 4x + 1$

(2) $y = 8x^3 - 12x^2 + 6x - 1$
 $y' = 24x^2 - 24x + 6$

(3) $y = x^4 - 4x^3 + 10x^2 - 12x + 9$
 $y' = 4x^3 - 12x^2 + 20x - 12$

(4) $y = (16x^2 - 24x + 9)(2x + 3)$
 $= 32x^3 - 54x + 27$
 $y' = 96x^2 - 54$

3 次の関数について、与えられた微分係数を求めよ。

- (1) $f(x) = -3x^2 + 2x + 4, f'(0)$ (2) $f(x) = x^3 - 4x + 3, f'(1)$

(1) $f'(x) = -6x + 2$

(2) $f'(x) = 3x^2 - 4$

$f'(0) = 2$

$f'(1) = 3 - 4 = -1$

6-3 関数の微分①

4 次の関数を、() 内の変数で微分せよ。ただし、右辺では、変数以外の文字は定数とする。

- (1) $y=2t^2$ (t) (2) $S=\pi r^2$ (r) (3) $V=V_0(1+\beta t)$ (t)
 (4) $s=h+vt-at^2$ (t) (5) $t=k(a+bx)(c-dx)$ (x)

(1) $\frac{dy}{dt} = 4t$ (2) $\frac{dS}{dr} = 2\pi r$ (3) $V = V_0 + V_0\beta t$
 $\frac{dV}{dt} = V_0\beta$

(4) $\frac{ds}{dt} = V_0 - 2at$

(5) $t = kac + k(bc-ad)x - kbdx^2$

$\frac{dt}{dx} = k(bc-ad) - 2kbdx$

<性質+αの紹介>

$y = f(u) \cdot g(x)$
 $y' = f'(u)g(x) + f(u)g'(x)$

5 次の関数を微分せよ。

- (1) $y=x^2(3x-1)$ (2) $y=(x-1)(x^2+x-4)$ (3) $y=(x+2)^3$
 (4) $y=(x^2-x+1)^2$ (5) $y=(x^3-2x)^2$ (6) $y=(3x+2)^2(x+1)$

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

$y' = 9x^2 - 2x$ $y' = 3x^2 - 5$

(3) $y' = 3(x+2)^2 \times 1 = 3(x+2)^2$ (4) $y' = 2(x^2-x+1) \times (2x-1)$
 $y' = 2(x^2-x+1)(2x-1)$

(5) $y' = 2(x^3-2x) \cdot (3x^2-2)$
 $y' = 2x(x^2-2)(3x^2-2)$

(6) $y' = 2(3x+2) \cdot 3(x+1) + (3x+2)^2 \cdot 1$
 $= 6(3x+2)(x+1) + (3x+2)^2$
 $= (3x+2)\{6(x+1) + (3x+2)\}$
 $= (3x+2)(9x+8)$