

148. 微分⑦

$$(1) \frac{dy}{dx} = \frac{4}{y} \quad (2) \frac{dy}{dx} = -\frac{x}{y} \quad (3) \frac{dy}{dx} = -\frac{1}{\sin y}$$

$$(4) \frac{dy}{dx} = \frac{4}{3} \quad (5) \frac{dy}{dx} = -4 \sin t \quad (6) \frac{dy}{dx} = \frac{-t^2 + 2t + 1}{2t}$$

次の関数について $\frac{dy}{dx}$ を求めよ。

$$(1) y^2 = 8x$$

$$\text{両辺を } x \text{ で微分すると } 2y \cdot \frac{dy}{dx} = 8 \Leftrightarrow \frac{dy}{dx} = \frac{4}{y}$$

$$(2) x^2 + y^2 = 2$$

$$\text{両辺を } x \text{ で微分すると } 2x + 2y \cdot \frac{dy}{dx} = 0 \Leftrightarrow \frac{dy}{dx} = -\frac{x}{y}$$

$$(3) x = \cos y$$

$$\text{両辺を } x \text{ で微分すると } 1 = (-\sin y) \cdot \frac{dy}{dx} \Leftrightarrow \frac{dy}{dx} = -\frac{1}{\sin y}$$

$$(4) \begin{cases} x = t^3 \\ y = 2t^2 - 1 \end{cases}$$

$$\frac{dx}{dt} = 3t, \quad \frac{dy}{dt} = 4t \quad \text{より} \quad \frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}} = \frac{4t}{3t} = \frac{4}{3}$$

$$(5) \begin{cases} x = \sin t \\ y = \cos 2t + 1 \end{cases}$$

$$\frac{dx}{dt} = \cos t, \quad \frac{dy}{dt} = -2 \sin 2t \quad \text{より} \quad \frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}} = \frac{-2 \sin 2t}{\cos t} = \frac{-4 \sin t \cos t}{\cos t} = -4 \sin t$$

$$(6) \begin{cases} x = \frac{1+t^2}{1-t^2} \\ y = \frac{2t}{1-t^2} \end{cases}$$

$$\frac{dx}{dt} = \frac{2t \cdot (1-t^2) - (1+t^2) \cdot (-2t)}{(1-t^2)^2} = \frac{4t}{(1-t^2)^2}, \quad \frac{dy}{dt} = \frac{2 \cdot (1-t^2) - 2t \cdot (-2t)}{(1-t^2)^2} = \frac{-2t^2 + 4t + 2}{(1-t^2)^2} \quad \text{より}$$

$$\frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}} = \frac{\frac{-2t^2 + 4t + 2}{(1-t^2)^2}}{\frac{4t}{(1-t^2)^2}} = \frac{-2t^2 + 4t + 1}{2t}$$