

数学的準備 No.8

微分・積分(1) 初等関数の微積分

1. 次の微分を求めなさい.

(a) $y = a$ (a は定数)

$$y' = 0$$

(b) $y = x$

$$y' = 1$$

(c) $y = x^2$

$$y' = 2x$$

(d) $y = x^3$

$$y' = 3x^2$$

(e) $y = (3x + 5)^4$

$$y' = 4(3x+5)^3 \times 3 = 12(3x+5)^3$$

(f) $y = (1 - 4x)^5$

$$y' = -20(1-4x)^4$$

2. 次の微分を求めなさい.

(a) $y = \sin x$

$$y' = \cos x$$

(b) $y = \cos x$

$$y' = -\sin x$$

(c) $y = e^x$

$$y' = e^x$$

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

$$y' = -e^{-x}$$

(e) $y = \ln x$

$$y' = \frac{1}{x}$$

(f) $y = \ln(x - a)$ (a は定数)

$$y' = \frac{1}{x-a}$$

C = 積分定数とする.

3. 次の積分を求めなさい.

(a) $\int 0 \, dx = C$

(b) $\int a \, dx$ (a は定数)

$$= ax + C$$

(c) $\int x \, dx$

$$= \frac{x^2}{2} + C$$

(d) $\int x^2 \, dx$

$$= \frac{x^3}{3} + C$$

(e) $\int e^{-x} \, dx$

$$= -e^{-x} + C$$

(f) $\int \sin x \, dx$

$$= -\cos x + C$$

(g) $\int \cos x \, dx$

$$= \sin x + C$$

4. 次の積分を求めなさい.

(a) $\int \frac{1}{x} \, dx$

$$= \ln|x| + C$$

(b) $\int \frac{1}{x-a} \, dx$ (a は定数)

$$= \ln|x-a| + C$$

(c) $\int \frac{1}{(x+a)^2} \, dx$ (a は定数)

$$= -\frac{1}{x+a} + C$$