

### 第3章 1 「不定積分」 第2回

解答

1. (1)  $\frac{1}{8}x^8 + C$   
 (2)  $-\frac{1}{5x^5} + C$   
 (3)  $\frac{4}{5}\sqrt[4]{x^5} + C$   
 (4)  $-\frac{3}{\sqrt[3]{x}} + C$

2. (1)  $2x^2 + 5x + C$   
 (2)  $x^3 - 2x^2 + 5x + C$   
 (3)  $-2\sin x + 3e^x + C$   
 (4)  $-\cos x - 3\log|x| + C$   
 (5)  $\frac{1}{5}x^5 - x^2 - \frac{1}{x} + C$

3. (1)  $\frac{1}{15}(3x-2)^5 + C$   
 (2)  $\frac{1}{3}\sin 3x + C$   
 (3)  $-e^{-x} + C$   
 (4)  $\frac{2}{3}\sqrt{(x+2)^3} + C$

解説

1. (1)  $\int x^7 dx = \frac{1}{8}x^8 + C$   
 (2)  $\int \frac{1}{x^6} dx = \int x^{-6} dx$   
 $= -\frac{1}{5}x^{-5} + C = -\frac{1}{5x^5} + C$   
 (3)  $\int \sqrt[4]{x} dx = \int x^{\frac{1}{4}} dx$   
 $= \frac{4}{5}x^{\frac{5}{4}} + C = \frac{4}{5}\sqrt[4]{x^5} + C$   
 (4)  $\int \frac{1}{x\sqrt[3]{x}} dx = \int x^{-\frac{4}{3}} dx$   
 $= -3x^{-\frac{1}{3}} + C = -\frac{3}{\sqrt[3]{x}} + C$

2. (1)  $\int (4x+5) dx = 4 \int x dx + 5 \int 1 dx$   
 $= 2x^2 + 5x + C$   
 (2)  $\int (3x^2 - 4x + 5) dx$   
 $= 3 \int x^2 dx - 4 \int x dx + 5 \int 1 dx$   
 $= x^3 - 2x^2 + 5x + C$   
 (3)  $\int (-2\cos x + 3e^x) dx$   
 $= -2 \int \cos x dx + 3 \int e^x dx$   
 $= -2\sin x + 3e^x + C$   
 (4)  $\int \left(\sin x - \frac{3}{x}\right) dx$   
 $= \int \sin x dx - 3 \int \frac{1}{x} dx$   
 $= -\cos x - 3\log|x| + C$

$$(5) \int \left(x^2 - \frac{1}{x}\right)^2 dx$$

$$= \int \left(x^4 - 2x + \frac{1}{x^2}\right) dx$$

$$= \int x^4 dx - 2 \int x dx + \int \frac{1}{x^2} dx$$

$$= \frac{1}{5}x^5 - x^2 - \frac{1}{x} + C$$

3. (1)  $\int x^4 dx = \frac{1}{5}x^5 + C$  より

$$\int (3x-2)^4 dx = \frac{1}{3} \cdot \frac{1}{5}(3x-2)^5 + C$$

$$= \frac{1}{15}(3x-2)^5 + C$$

(2)  $\int \cos x dx = \sin x + C$  より

$$\int \cos 3x dx = \frac{1}{3}\sin 3x + C$$

(3)  $\int e^x dx = e^x + C$  より

$$\int e^{-x} dx = -e^{-x} + C$$

(4)  $\int \sqrt{x} dx = \frac{2}{3}x^{\frac{3}{2}} + C$  より

$$\int \sqrt{x+2} dx = \frac{2}{3}(x+2)^{\frac{3}{2}} + C$$

$$= \frac{2}{3}\sqrt{(x+2)^3} + C$$