

1 ● 次の不定積分を求めよ。

(1)  $\int x^3 dx$

(与式)  $= \frac{1}{3+1} x^{3+1} + C$

$= \frac{1}{4} x^4 + C$

(C は積分定数, 以下同様)

(2)  $\int x^4 dx$

(与式)  $= \frac{1}{4+1} x^{4+1} + C$

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

(3)  $\int \frac{1}{x^3} dx$

(与式)  $= \int x^{-3} dx = \frac{1}{-3+1} x^{-3+1} + C$

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

(4)  $\int \frac{1}{x^5} dx$

(与式)  $= \int x^{-5} dx = \frac{1}{-5+1} x^{-5+1} + C$

$= -\frac{1}{4} x^{-4} + C = -\frac{1}{4x^4} + C$

(5)  $\int \frac{1}{x} dx$

(与式)  $= \log|x| + C$

(6)  $\int \frac{5}{x} dx$

(与式)  $= 5 \log|x| + C$

(7)  $\int x^{\frac{1}{3}} dx$

(与式)  $= \frac{1}{\frac{1}{3}+1} x^{\frac{1}{3}+1} + C = \frac{3}{4} x^{\frac{4}{3}} + C$

(8)  $\int \sqrt[5]{x} dx$

(与式)  $= \int x^{\frac{1}{5}} dx = \frac{1}{\frac{1}{5}+1} x^{\frac{1}{5}+1} + C$

$= \frac{5}{6} x^{\frac{6}{5}} + C = \frac{5}{6} x \sqrt[5]{x} + C$

2 ● 次の不定積分を求めよ。

(1)  $\int \cos x dx$

(与式)  $= \sin x + C$

(C は積分定数, 以下同様)

(2)  $\int \sin x dx$

(与式)  $= -\cos x + C$

(3)  $\int (2\sin x + 3\cos x) dx$

(与式)  $= -2\cos x + 3\sin x + C$

(4)  $\int (4\cos x - 3\sin x) dx$

(与式)  $= 4\sin x + 3\cos x + C$

(5)  $\int \frac{1}{\cos^2 x} dx$

(与式)  $= \tan x + C$

(6)  $\int \frac{1}{1-\sin^2 x} dx$

(与式)  $= \int \frac{1}{\cos^2 x} dx = \tan x + C$

(7)  $\int \left( \cos x + \frac{1}{\cos^2 x} \right) dx$

(与式)  $= \sin x + \tan x + C$

(8)  $\int \frac{\sin^3 x + 1}{\sin^2 x} dx$

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

$= -\cos x - \frac{1}{\tan x} + C$

3 ● 次の不定積分を求めよ。

(1)  $\int e^x dx$

(与式)  $= e^x + C$

(C は積分定数, 以下同様)

(2)  $\int 3e^x dx$

(与式)  $= 3e^x + C$

(3)  $\int e \cdot e^x dx$

(与式)  $= e \cdot e^x + C$

$= e^{x+1} + C$

(4)  $\int e^{x+2} dx$

(与式)  $= \int e^2 \cdot e^x dx$

$= e^2 \cdot e^x + C$

$= e^{x+2} + C$

(5)  $\int 3^x dx$

(与式)  $= \frac{3^x}{\log 3} + C$

(6)  $\int 4 \cdot 3^x dx$

(与式)  $= 4 \cdot \frac{3^x}{\log 3} + C$

$= \frac{4 \cdot 3^x}{\log 3} + C$

(7)  $\int \frac{1}{2} \cdot 3^x dx$

(与式)  $= \frac{1}{2} \cdot \frac{3^x}{\log 3} + C$

$= \frac{3^x}{2 \log 3} + C$

(8)  $\int 3^{x+2} dx$

(与式)  $= \int 3^2 \cdot 3^x dx$

$= 3^2 \cdot \frac{3^x}{\log 3} + C$

$= \frac{3^{x+2}}{\log 3} + C$

4 ● 次の不定積分を求めよ。

(1)  $\int 2x^3 dx$

(与式)  $= 2 \cdot \frac{1}{3+1} x^{3+1} + C = \frac{1}{2} x^4 + C$

(C は積分定数, 以下同様)

(2)  $\int \frac{dx}{x^2}$

(与式)  $= \int x^{-2} dx = \frac{1}{-2+1} x^{-2+1} + C$

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

(3)  $\int \frac{3}{x} dx$

(与式)  $= 3 \log|x| + C$

(4)  $\int x^{\frac{1}{4}} dx$

(与式)  $= \frac{1}{\frac{1}{4}+1} x^{\frac{1}{4}+1} + C$

$= \frac{4}{5} x^{\frac{5}{4}} + C$

(5)  $\int 5 \sqrt[3]{x^2} dx$

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

$= 3x^{\frac{5}{3}} + C = 3 \sqrt[3]{x^5} + C$

$= 3x \sqrt[3]{x^2} + C$

(6)  $\int \left( 5x^4 - \frac{2}{x^3} + 1 \right) dx$

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

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

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

(7)  $\int \frac{x^3+2}{x} dx$

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

$= \frac{1}{2+1} x^{2+1} + 2 \log|x| + C$

$= \frac{1}{3} x^3 + 2 \log|x| + C$

(8)  $\int \frac{1}{\sqrt{x}} dx$

(与式)  $= \int x^{-\frac{1}{2}} dx = \frac{1}{-\frac{1}{2}+1} x^{-\frac{1}{2}+1} + C$

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

5 ● 次の不定積分を求めよ。

(1)  $\int \cos x dx$

(与式)  $= \sin x + C$

(C は積分定数, 以下同様)

(2)  $\int 2\sin x dx$

(与式)  $= -2\cos x + C$

$$(3) \int \frac{3}{\cos^2 x} dx$$

(与式) =  $3 \tan x + C$

$$(4) \int \frac{dx}{\sin^2 x}$$

(与式) =  $-\frac{1}{\tan x} + C$

$$(5) \int (\sin x + 2 \cos x) dx$$

(与式) =  $-\cos x + 2 \sin x + C$

$$(6) \int \left( 3 \cos x - \frac{2}{\cos^2 x} \right) dx$$

(与式) =  $3 \sin x - 2 \tan x + C$

$$(7) \int \tan x \cos x dx$$

(与式) =  $\int \frac{\sin x}{\cos x} \cdot \cos x dx$   
 $= \int \sin x dx$   
 $= -\cos x + C$

$$(8) \int \frac{dx}{1 - \sin^2 x}$$

(与式) =  $\int \frac{dx}{\cos^2 x}$   
 $= \tan x + C$

6 ● 次の不定積分を求めよ。

$$(1) \int 3e^x dx$$

(与式) =  $3e^x + C$   
 (C は積分定数, 以下同様)

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

(与式) =  $\frac{2^x}{\log 2} + C$

$$(3) \int \left( \frac{1}{3} \right)^x dx$$

(与式) =  $\frac{\left( \frac{1}{3} \right)^x}{\log \frac{1}{3}} + C$   
 $= -\frac{1}{3^x \log 3} + C$

$$(4) \int (e^x + 5^x) dx$$

(与式) =  $e^x + \frac{5^x}{\log 5} + C$

$$(5) \int e^{x+1} dx$$

(与式) =  $\int e \cdot e^x dx = e \cdot e^x + C$   
 $= e^{x+1} + C$

$$(6) \int e^{x+2} dx$$

(与式) =  $\int e^2 \cdot e^x dx$   
 $= e^2 \cdot e^x + C$   
 $= e^{x+2} + C$

$$(7) \int 3 \cdot 3^x dx$$

(与式) =  $3 \cdot \frac{3^x}{\log 3} + C$   
 $= \frac{3^{x+1}}{\log 3} + C$

$$(8) \int 3^{x+2} dx$$

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

7 ● 次の不定積分を求めよ。

$$(1) \int 3x^4 dx$$

(与式) =  $3 \cdot \frac{1}{4+1} x^{4+1} + C = \frac{3}{5} x^5 + C$   
 (C は積分定数, 以下同様)

$$(2) \int \frac{dx}{x^3}$$

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

$$(3) \int \frac{6}{x} dx$$

(与式) =  $6 \log |x| + C$

$$(4) \int x^{\frac{1}{2}} dx$$

(与式) =  $\frac{1}{\frac{1}{2}+1} x^{\frac{1}{2}+1} + C = \frac{4}{5} x^{\frac{3}{2}} + C$

$$(5) \int \left( 7y^6 - \frac{1}{y^2} + 1 \right) dy$$

(与式)  
 $= \int (7y^6 - y^{-2} + 1) dy$   
 $= 7 \cdot \frac{1}{6+1} y^{6+1} - \frac{1}{-2+1} y^{-2+1} + y + C$   
 $= y^7 + y^{-1} + y + C$

$$(6) \int \frac{2x^3 - 4x + 3}{x} dx$$

(与式) =  $\int \left( 2x^2 - 4 + \frac{3}{x} \right) dx$   
 $= 2 \cdot \frac{1}{2+1} x^{2+1} - 4x + 3 \log |x| + C$   
 $= \frac{2}{3} x^3 - 4x + 3 \log |x| + C$

8 ● 次の不定積分を求めよ。

$$(1) \int \sin x dx$$

(与式) =  $-\cos x + C$   
 (C は積分定数, 以下同様)

$$(2) \int 2 \cos x dx$$

(与式) =  $2 \sin x + C$

$$(3) \int \frac{4}{\cos^2 x} dx$$

(与式) =  $4 \tan x + C$

$$(4) \int \frac{dx}{\sin^2 x}$$

(与式) =  $-\frac{1}{\tan x} + C$

$$(5) \int (3 \sin x + 2 \cos x) dx$$

(与式) =  $-3 \cos x + 2 \sin x + C$

$$(6) \int \left( \frac{3}{\cos^2 x} - 4 \cos x \right) dx$$

(与式) =  $3 \tan x - 4 \sin x + C$

$$(7) \int \tan^2 x dx$$

(与式) =  $\int \left( \frac{1}{\cos^2 x} - 1 \right) dx$   
 $= \tan x - x + C$

$$(8) \int \left( 1 + \frac{1}{\tan x} \right) \sin x dx$$

(与式) =  $\int \left( 1 + \frac{\cos x}{\sin x} \right) \sin x dx$   
 $= \int (\sin x + \cos x) dx$   
 $= -\cos x + \sin x + C$

9 ● 次の不定積分を求めよ。

$$(1) \int 4e^x dx$$

(与式) =  $4e^x + C$   
 (C は積分定数, 以下同様)

$$(2) \int 3^x dx$$

(与式) =  $\frac{3^x}{\log 3} + C$

$$(3) \int \frac{dx}{7^x}$$

(与式) =  $\int \left( \frac{1}{7} \right)^x dx = \frac{\left( \frac{1}{7} \right)^x}{\log \frac{1}{7}} + C$   
 $= -\frac{1}{7^x \log 7} + C$

$$(4) \int (2^x - e^x) dx$$

(与式) =  $\frac{2^x}{\log 2} - e^x + C$

$$(5) \int e^{x+3} dx$$

(与式) =  $\int e^3 \cdot e^x dx = e^3 \cdot e^x + C = e^{x+3} + C$

$$(6) \int (e^{x+4} + 5^{x+1}) dx$$

(与式) =  $\int (e^4 \cdot e^x + 5 \cdot 5^x) dx$   
 $= e^4 \cdot e^x + 5 \cdot \frac{5^x}{\log 5} + C$   
 $= e^{x+4} + \frac{5^{x+1}}{\log 5} + C$