

積分おさらい NO1 テスト

学籍番号

氏名

問3 次の不定積分を求めよ.

$$(31) \int \frac{1}{x^3} dx$$

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

$$(32) \int \sqrt[3]{t^2} dt$$

$$\int t^{\frac{2}{3}} dt = \frac{1}{\frac{2}{3}+1} t^{\frac{2}{3}+1} + C = \frac{3}{5} t^{\frac{5}{3}} + C$$

$$(33) \int \frac{(\sqrt{x}-1)^2}{x} dx$$

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

$$= x - 4\sqrt{x} + \ln|x| + C$$

$$(34) \int (\sin x + 2 \cos x) dx$$

$$\int \sin x dx + 2 \int \cos x dx = -\cos x + 2 \sin x + C$$

$$(35) \int \frac{\cos^3 x + 1}{\cos^2 x} dx$$

$$\int \cos x dx + \int \frac{dx}{\cos^2 x} = \sin x + \tan x + C$$

$$(36) \int (\varepsilon^x - 2^x) dx$$

$$\int \varepsilon^x dx - \int 2^x dx = \varepsilon^x - \frac{2^x}{\ln 2} + C$$

$$(37) \int (\cos^2 x \cdot \sin x) dx$$

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

$$(38) \int \frac{2x}{x^2+4} dx$$

$$\int \frac{(x^2+4)'}{x^2+4} dx = \ln|x^2+4| + C$$

$$(39) \int \tan x dx$$

$$\int \frac{\sin x}{\cos x} dx = -\int \frac{(\cos x)'}{\cos x} dx = -\ln|\cos x| + C$$

$$(40) \int x \sin x dx$$

$$\int x(-\cos x)' dx = x(-\cos x) - \int 1 \cdot (-\cos x) dx$$

$$= -x \cos x + \sin x + C$$

$$(41) \int \ln x dx$$

$$\int \ln x (x)' dx = \ln x(x) - \int (\ln x)'(x) dx = x \ln x - x + C$$

$$(42) \int \frac{2x^2-1}{x+1} dx$$

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

$$(43) \int \frac{1}{x^2-1} dx$$

$$-\frac{1}{2} \int \frac{dx}{x+1} + \frac{1}{2} \int \frac{dx}{x-1} = \frac{1}{2} \ln \left| \frac{x-1}{x+1} \right| + C$$

積分の基本公式

$$\int x^n dx = \frac{1}{n+1} x^{n+1} + C \quad \int \cos x dx = \sin x + C$$

$$\int \sin x dx = -\cos x + C \quad \int \frac{1}{\cos^2 x} dx = \tan x + C$$

$$\int e^x dx = e^x + C \quad \int a^x dx = \frac{a^x}{\log a} + C$$

$$\int \frac{1}{x} dx = \ln|x| + C \quad \int \frac{f'(x)}{f(x)} dx = \ln|f(x)| + C$$

$$\int \cos mx dx = \frac{1}{m} \sin mx \quad \int \sin mx dx = -\frac{1}{m} \cos mx$$

$$\int f^n(x) \cdot f'(x) dx = \frac{1}{n+1} f^{n+1}(x)$$

$$\int f'(x) \cdot g(x) dx = f(x) \cdot g(x) - \int f(x) \cdot g'(x)$$