

積分大復習 part2 [練習問題]

次の不定積分を計算せよ。

(1) $\int \frac{1}{2} \sin 2x \, dx = \frac{1}{2} \cdot \cos 2x + C$

(2) $\int \frac{1}{2} \cos \frac{1}{2}x \, dx = 2 \cdot \sin \frac{1}{2}x + C$

(3) $\int \frac{1}{4} e^{4x+1} \, dx = \frac{1}{4} e^{4x+1} + C$

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

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

(6) $\int x^{-1} \, dx = \int \frac{1}{x} \, dx = \log|x| + C$

(7) $\int 2x \sin x^2 \, dx = -\cos x^2 + C$

(8) $\int \frac{1}{2} 2x \sin x^2 \, dx = -\frac{1}{2} \cos x^2 + C$

(9) $\int \frac{5}{4} x^3 \cos \frac{1}{5} x^4 \, dx = \frac{5}{4} \sin \frac{1}{5} x^4 + C$

(10) $\int e^{\sin x} \cos x \, dx = e^{\sin x} + C$

(11) $\int \frac{\log x}{x} \, dx = \int \frac{1}{x} \cdot \log x \, dx = \frac{1}{2} (\log x)^2 + C$

(12) $\int \frac{1}{e} e^{x-1} (x^e + 8)^{12} \, dx = \frac{1}{e} \cdot \frac{1}{13} (x^e + 8)^{13} + C$

(13) $\int \frac{\cos x}{\sin x} \, dx = \log|\sin x| + C$

(14) $\int \frac{1}{2} 2x \sin x^2 \sin(\cos x^2) \, dx = +\frac{1}{2} \cos(\cos x^2) + C$

(15) $\int \frac{1}{2} \frac{2x}{x^2+4} \, dx = \frac{1}{2} \log(x^2+4) + C$

(16) $\int \frac{1}{2} \frac{2(x+2)}{x^2+4x+8} \, dx = \frac{1}{2} \log|x^2+4x+8| + C$

(17) $\int \frac{1}{3} \frac{3(x^2+1)}{\sqrt{x^3+3x+\sqrt{2}}} \, dx = \frac{1}{3} \cdot 2 \cdot \sqrt{x^2+3x+\sqrt{2}} + C$

(18) $\int \frac{1}{x^2-9x} \, dx = \int \frac{-1}{x} \frac{-27x^2}{1-9x^3} \, dx = -\frac{1}{27} \log|1-9x^3| + C$

(19) $\int \frac{5x}{\sqrt{1-x^2}} \, dx = \int \left(-\frac{1}{2}\right) \frac{-2x}{\sqrt{1-x^2}} \, dx = -\frac{5}{2} \cdot 2 \cdot \sqrt{1-x^2} + C$

(20) $\int \frac{x^3+2x}{\sqrt{x}} \, dx = \int \left(x^{\frac{5}{2}} + 2 \cdot x^{\frac{1}{2}}\right) \, dx = \frac{2}{7} x^{\frac{7}{2}} + 2 \cdot \frac{2}{3} x^{\frac{3}{2}} + C$

(21) $\int \frac{1}{x \log x^3} \, dx = \int \frac{1}{x \cdot 3 \cdot \log x} \, dx = \frac{1}{3} \log|\log x| + C$

(22) $\int 2^x \, dx = 2^x \frac{1}{\log 2} + C = \int e^{\log 2^x} \, dx = \int e^{x \cdot \log 2} \, dx = \int e^{x \cdot \log 2} \, dx = \frac{e^{x \cdot \log 2}}{\log 2} + C$

(23) $\int \frac{\log_2 x^2}{x} \, dx = \int \frac{2 \cdot \log_2 x}{x} \, dx = 2 \cdot \int \frac{\log_2 x}{x} \, dx = \frac{2}{\log 2} \cdot \frac{1}{2} (\log x)^2 + C$

(24) $\int \frac{1}{2\sqrt{x}} \cdot \frac{1}{\sqrt{1-\sqrt{x}}} \, dx = -2 \cdot 2 \cdot (1-\sqrt{x})^{\frac{1}{2}} + C$