201-SH3-AB - Exercises #8 - Mixed Integrals

Evaluate the following integrals.

(1) $\displaystyle\int_1^e \frac{\ln x}{x}\,dx$

(2) $\displaystyle\int (2x^2+1)e^{4x^3+6x}\,dx$

(3) $\displaystyle\int \frac{\cos\sqrt{x}}{\sqrt{x}}\,dx$

(4) $\displaystyle\int x\ln(2x-1)\,dx$

(5) $\displaystyle\int \frac{3\sqrt{t}-3+t\cos(2t)}{2t}\,dt$

(6) $\displaystyle\int \frac{5x^3\sin x+\sqrt{x}-10}{x^3}\,dx$

(7) $\displaystyle\int_0^8 \frac{e^{\sqrt{x+1}}}{\sqrt{x+1}}\,dx$

(8) $\displaystyle\int (x^3+2)\sin(x^4+8x)\,dx$

(9) $\displaystyle\int_0^1 (t^2+1)e^{t^3+3t}\,dt$

(10) $\displaystyle\int_{-2}^0 \frac{x+2}{\sqrt{x^2+4x+9}}\,dx$

(11) $\displaystyle\int_{-\frac{1}{2}}^0 \frac{e^{-2x}}{\sqrt{3e^{-2x}+1}}\,dx$

(12) $\displaystyle\int 2x\ln(3x)\,dx$

(13) $\displaystyle\int \left(\cos x+5^x+\sqrt{4x}-e^5\right)\,dx$

(14) $\displaystyle\int \frac{x(2-\sqrt{x})+x^2\sec^2 x}{x^2}\,dx$

(15) $\displaystyle\int_{\frac{1}{3}}^1 (1-6x)\ln x\,dx$

(16) $\displaystyle\int_0^{\pi/4} \sin(2x)\sqrt[3]{2+\cos(2x)}\,dx$

(17) $\displaystyle\int_{\frac{e}{2}}^e \frac{dx}{x\ln(2x)}$

(18) $\displaystyle\int \frac{3\sqrt[4]{x}+6\sqrt[3]{x^5}-4x^2}{2\sqrt{x}}\,dx$

(19) $\displaystyle\int (3x^2-1)e^{4x}\,dx$

(20) $\displaystyle\int (3x+2)^2\cos(5x)\,dx$

(21) $\displaystyle\int \frac{\sin x\cos x}{\sqrt[3]{\sin^2 x+7}}\,dx$

(22) $\displaystyle\int 3x^2\sin x\,dx$

(23) $\displaystyle\int_1^{e^2} \frac{(\ln x+1)^2}{3x}\,dx$

(24) $\displaystyle\int \frac{(1+\sqrt{x})^5}{\sqrt{x}}\,dx$

(25) $\displaystyle\int x2^x\,dx$

(26) $\displaystyle\int \ln(2x)\,dx$

ANSWERS:

(1) $1/2$

(2) $\frac{1}{6}e^{4x^3+6x}+C$

(3) $2\sin\sqrt{x}+C$

(4) $\frac{1}{2}x^2\ln(2x-1)-\frac{1}{2}\ln(2x-1)+C$

(5) $3\sqrt{t}-\frac{3}{2}\ln|t|+\frac{1}{2}\sin t\cos t)+C$

(6) $-\frac{2}{3x^{3/2}}+\frac{5}{x^2}-5\cos(x)+C$

(7) $2e\left(e^2-1\right)$

(8) $\frac{1}{4}\cos\left(x^4+8x\right)+C$

(9) $\frac{1}{3}\left(e^4-1\right)$

(10) $3-\sqrt{5}$

(11) $\frac{1}{3}\left(\sqrt{1+3e}-2\right)$

(12) $x^2\ln(3x)-\frac{1}{2}x^2+C$

(13) $\frac{4}{3}x^{3/2}-e^5x+\frac{1}{\ln 5}5^x+\sin x+C$

(14) $2\ln|x|-2\sqrt{x}+\tan x+C$

(15) $2/3$

(16) $\frac{3}{8}\left(-2^{4/3}+3^{4/3}\right)$

(17) $\ln(1+\ln 2)$

(18) $-\frac{4}{5}x^{5/2}+2x^{3/2}+\frac{18}{13}x^{13/6}+C$

(19) $\frac{1}{32}e^{4x}\left(24x^2-12x-5\right)+C$

(20) $\frac{1}{5}(3x+2)^2\sin 5x+\frac{6}{25}(3x+2)\cos 5x-\frac{18}{125}\sin 5x+C$

(21) $\frac{3}{4}\left(\sin^2(x)+7\right)^{2/3}+C$

(22) $-3x^2\cos x+6x\sin x+6\cos x+C$

(23) $26/9$

(24) $\frac{1}{3}(1+\sqrt{x})^6+C$

(25) $\frac{1}{\ln 2}x2^x-\frac{1}{(\ln 2)^2}2^x+C$

(26) $x\ln(2x)-x+C$