201-203-RE - Practice Set #3: Integration by Substitution

Evaluate the following integrals.

(1) $\displaystyle \int \frac{3}{x(\ln(x))^4}\,dx$

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

(3) $\displaystyle \int \frac{8x}{x^2+4}\,dx$

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

(5) $\displaystyle \int \frac{8x}{(x^2+2)^2}\,dx$

(6) $\displaystyle \int \frac{3}{x(\ln(x)+4)^4}\,dx$

(7) $\displaystyle \int \frac{x-3}{5-6x+x^2}\,dx$

(8) $\displaystyle \int \frac{\sqrt[3]{3+\ln(x)}}{x}\,dx$

(9) $\displaystyle \int \cos(x)(2-\sin(x))^4\,dx$

(10) $\displaystyle \int \frac{\sec^2(x)}{1+2\tan(x)}\,dx$

(11) $\displaystyle \int \frac{x+4}{\sqrt[4]{x^2+8x}}\,dx$

(12) $\displaystyle \int 9x^2\sqrt{x^3+1}\,dx$

(13) $\displaystyle \int \frac{e^{2x}+x}{\sqrt{e^{2x}+x^2}}\,dx$

(14) $\displaystyle \int \frac{(2+3\ln(x))^5}{x}\,dx$

(15) $\displaystyle \int \frac{t+1}{t^2+2t+3}\,dt$

(16) $\displaystyle \int \frac{6x^3e^{2x}-5x^2}{x^3}\,dx$

(17) $\displaystyle \int \frac{6xe^{3x}-18+5x^4}{3x}\,dx$

(18) $\displaystyle \int \frac{8x^2e^{-x}+24x+20}{4x^2}\,dx$

(19) $\displaystyle \int \frac{4x^{1/2}e^{2x}+3x^3-6}{\sqrt{x}}\,dx$

(20) $\displaystyle \int \frac{x^{2/3}+3x^2e^{3x}-5}{x^2}\,dx$

(21) $\displaystyle \int \frac{3\sqrt{x}-4x^2e^{3x}}{3x^2}\,dx$

(22) $\displaystyle \int \left(\frac{(2^{3x})}{3}+\frac{4}{3x+1}\right)\,dx$

(23) $\displaystyle \int \frac{20x^2-27x+11}{4x-3}\,dx$

(24) $\displaystyle \int \frac{x^3+5x}{x^2+1}\,dx$

(25) $\displaystyle \int \left(3^{-x}+\frac{5}{e^{3x}}-e^3\right)\,dx$

(26) $\displaystyle \int \left(\frac{6}{3x+5}+\pi^4\right)\,dx$

(27) $\displaystyle \int \left(4^{-5x}+e^\pi\right)\,dx$

ANSWERS:

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

(2) $\displaystyle \frac{4}{3}\ln(4+e^{3x})+C$

(3) $4\ln(x^2+4)+C$

(4) $\displaystyle \frac{1}{9}(3x^2+6x)^{3/2}+C$

(5) $\displaystyle \frac{-4}{x^2+2}+C$

(6) $\displaystyle \frac{-1}{(\ln(x)+4)^3}+C$

(7) $\displaystyle \frac{1}{2}\ln|x^2-6x+5|+C$

(8) $\displaystyle \frac{3}{4}(3+\ln(x))^{4/3}+C$

(9) $\displaystyle \frac{-(2-\sin(x))^5}{5}+C$

(10) $\displaystyle \frac{1}{2}\ln|1+2\tan(x)|+C$

(11) $\displaystyle \frac{2}{3}(x^2+8x)^{3/4}+C$

(12) $2(x^3+1)^{3/2}+C$

(13) $(e^{2x}+x^2)^{1/2}+C$

(14) $\displaystyle \frac{1}{18}(2+3\ln(x))^6+C$

(15) $\displaystyle \frac{1}{2}\ln(t^2+2t+3)+C$

(16) $3e^{2x}-5\ln|x|+C$

(17) $\displaystyle \frac{2}{3}e^{3x}-6\ln|x|+\frac{5}{12}x^4+C$

(18) $\displaystyle -2e^{-x}+6\ln|x|-\frac{5}{x}+C$

(19) $\displaystyle 2e^{2x}+\frac{6}{7}x^{7/2}-12\sqrt{x}+C$

(20) $\displaystyle \frac{-3}{x^{1/3}}+e^{3x}+\frac{5}{x}+C$

(21) $\displaystyle -\frac{2}{\sqrt{x}}-\frac{4}{9}e^{3x}+C$

(22) $\displaystyle \frac{2^{3x}}{9\ln(2)}+\frac{4}{3}\ln|3x+1|+C$

(23) $\displaystyle \frac{5}{2}x^2-3x+\frac{1}{2}\ln|4x-3|+C$

(24) $\displaystyle \frac{1}{2}x^2+2\ln(x^2+1)+C$

(25) $\displaystyle -\frac{3^{-x}}{\ln(3)}-\frac{5}{3}e^{-3x}-e^3x+C$

(26) $2\ln|3x+5|+\pi^4x+C$

(27) $\displaystyle -\frac{4^{-5x}}{5\ln(4)}+e^\pi x+C$