201-SH3-AB - Exercises #7: Integration By Parts

Use integration by parts for each of the following integrals.

(1) $\displaystyle\int_0^1 2(2x-1)e^{2x}\ dx$

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

(3) $\displaystyle\int 18x^2\ln(2x)\ dx$

(4) $\displaystyle\int (6x-5)\ln(2x)\ dx$

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

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

(7) $\displaystyle\int (24x^2-72x)\ln(3x)\ dx$

(8) $\displaystyle\int (3x-x^2)e^{-2x}\ dx$

(9) $\displaystyle\int (12x^2-36x)\ln(2x)\ dx$

(10) $\displaystyle\int_0^{\pi/3} (3-x)\cos(2x)\ dx$

(11) $\displaystyle\int_0^{\pi/6} (2-5x)\sin(3x)\ dx$

(12) $\displaystyle\int (8x-1)\cos(2x)\ dx$

(13) $\displaystyle\int 6(x^2-1)\sin(2x)\ dx$

(14) $\displaystyle\int (x^3+x)\sin(3x)\ dx$

ANSWERS:

(1) 2

(2) $-e^{-x}(x^2+2x+6)+C$

(3) $6x^3\ln(2x)-2x^3+C$

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

(5) $-\frac{\ln(4x)}{3x^3}-\frac{1}{9x^3}+C$

(6) $\frac{e^{3x}}{27}(9x^2+30x+26)+C$

(7) $(8x^3-36x^2)\ln(3x)-\frac{8}{3}x^3+18x^2+C$

(8) $\frac{e^{-2x}}{2}(x^2-2x-1)+C$

(9) $(4x^3-18x^2)\ln(2x)-\frac{4}{3}x^3+9x^2+C$

(10) $\frac{3\sqrt{3}}{4}+\frac{3}{8}-\frac{\pi\sqrt{3}}{12}$

(11) $\frac{1}{9}$

(12) $\frac{1}{2}(8x-1)\sin(2x)+2\cos(2x)+C$

(13) $3(1-x^2)\cos(2x)+3x\sin(2x)+\frac{3}{2}\cos(2x)+C$

(14) $-\frac{1}{3}(x^3+x)\cos(3x)+\frac{1}{27}(9x^2+1)\sin(3x)+\frac{2}{9}x\cos(3x)+C$