1

$$\int (6x^3 - 5\sqrt[3]{x^2}) \ln 2x \, dx =$$

$$\int (6x^3 - 5x^{2/3}) \ln 2x = \int (6x^3 - 5x^{2/3})(\ln x + \ln 2) dx$$

$$= \int 6x^3 \ln 2 + 6x^3 \ln x - 5x^{2/3} \ln 2 - 5x^{2/3} \ln x) dx$$

$$= \underbrace{6\ln 2 \int x^3 dx}_{= 6\ln 2 \frac{x^4}{4}} + \underbrace{6\int x^3 \ln x \, dx}_{1} - \underbrace{5\ln 2 \int x^{2/3} dx}_{= 5\ln 2 \cdot \frac{3}{5} x^{5/3}} - 5\underbrace{\int x^{2/3} \ln x \, dx}_{2}$$

PP

1 $$\int x^3 \ln x \, dx = \left| \begin{matrix} u = \ln x & dv = x^3 dx \\ du = \frac{1}{x} dx & v = \frac{x^4}{4} \end{matrix} \right| = \frac{x^4}{4} \ln x -$$

$$\int \frac{x^4}{4} \cdot \frac{1}{x} dx = \frac{x^4}{4} \ln x - \frac{1}{4} \int x^3 dx = \frac{x^4}{4} \ln x - \frac{1}{16} x^4$$

2 $$\int x^{2/3} \ln x = \left| \begin{matrix} u = \ln x & dv = x^{2/3} \\ du = \frac{1}{x} & v = \frac{3}{5} x^{5/3} \end{matrix} \right| = \frac{3}{5} x^{5/3} \ln x -$$

$$\int \frac{3}{5} x^{5/3} \cdot \frac{1}{x} dx = \frac{3}{5} x^{5/3} \ln x - \frac{9}{25} x^{5/3}$$

$$= 6\ln 2 \cdot \frac{x^4}{4} + 6\left(\frac{x^4}{4} \ln x - \frac{1}{16} x^4\right) - 5\ln 2 \frac{3}{5} x^{5/3} - 5\left(\frac{3}{5} x^{5/3} \ln x - \frac{9}{25} x^{5/3}\right)$$

$$= \frac{3}{2} \ln 2 \cdot x^4 + \frac{3}{2} x^4 \ln x - \frac{3}{8} x^4 - 3\ln 2 \cdot x^{5/3} - 3x^{5/3} \ln x + \frac{9}{5} x^{5/3} + C$$

PP

2 $$\int (\ldots) \ldots = \left| \begin{matrix} u = 4x - 3 & dv = \sin(5x) \end{matrix} \right.$$

$$\int (4x-3)\sin(5x)\,dx \quad \left| \; du = 4\,dx \quad v = -\frac{1}{5}\cos(5x) \; \right|$$

$$= (4x-3)\left(-\frac{1}{5}\cos(5x)\right) - \int \left(-\frac{1}{5}\cos(5x)\right)\cdot 4\,dx$$

$$= -\frac{1}{5}(4x-3)\cos(5x) + \frac{4}{5}\int \cos(5x)\,dx$$

$$= -\frac{1}{5}(4x-3)\cos(5x) + \frac{4}{5}\cdot\frac{1}{5}\sin(5x) + C$$

$$= -\frac{1}{5}(4x-3)\cos(5x) + \frac{4}{25}\sin(5x) + C$$

(3)

$$\int (2-7x)\cos\frac{x}{4}\,dx = \left| \begin{matrix} u = 2-7x & dv = \cos\frac{x}{4} \\ du = -7 & v = 4\sin\frac{x}{4} \end{matrix} \right|$$

$$= (2-7x)\cdot 4\sin\left(\frac{x}{4}\right) - \int 4\sin\left(\frac{x}{4}\right)\cdot(-7)\,dx$$

$$= 4(2-7x)\cdot\sin\left(\frac{x}{4}\right) + 28\int \sin\frac{x}{4}\,dx$$

$$= 4(2-7x)\cdot\sin\left(\frac{x}{4}\right) - 112\cos\left(\frac{x}{4}\right) + C$$

(4)

PP

$$\int (2x+5)e^{-4x}\,dx = \left| \begin{matrix} u = 2x+5 & dv = e^{-4x} \\ du = 2 & v = -\frac{1}{4}e^{-4x} \end{matrix} \right| =$$

$$= (2x+5)\left(-\frac{1}{4}e^{-4x}\right) - \int \left(-\frac{1}{4}e^{-4x}\right)\cdot 2\,dx =$$

$$= -\frac{1}{4}(2x+5)e^{-4x} + \frac{1}{2}\int e^{-4x}\,dx =$$

$$= -\frac{1}{4}(2x+5)e^{-4x} + \frac{1}{2}\left(-\frac{1}{4}e^{-4x}\right) = -\frac{1}{4}(2x+5)e^{-4x} - \frac{1}{\ldots}e^{-4x}$$

$$\frac{}{4}(2x+5)e \quad \frac{}{2}\left(\frac{}{4}e\right) \qquad \frac{}{4}(2x+5)e \quad \frac{}{8}e$$