

التمرين الأول

$$\begin{aligned}\int_1^2 \frac{x-1}{x^2-2x+2} dx &= \frac{1}{2} \int_1^2 \frac{2x-2}{x^2-2x+2} dx \\ &= \frac{1}{2} \left[ \ln |x^2-2x+2| \right]_1^2 \\ &= \frac{1}{2} \left[ \ln(x^2-2x+2) \right]_1^2 \\ &= \frac{\ln 2}{2}\end{aligned}$$

$$\begin{aligned}\int_{-3}^0 (x^3 + 2x^2 - 1) dx &= \left[ \frac{x^{3+1}}{3+1} + 2 \frac{x^{2+1}}{2+1} - x \right]_{-3}^0 \\ &= \left[ \frac{x^4}{4} + \frac{2x^3}{3} - x \right]_{-3}^0 \\ &= (0) - \left( \frac{(-3)^4}{4} + \frac{2(-3)^3}{3} - (-3) \right) \\ &= -\frac{21}{4}\end{aligned}$$

$$\begin{aligned}\int_1^2 2e^{3x} dx &= \frac{2}{3} \int_1^2 3e^{3x} dx \\ &= \frac{2}{3} \left[ e^{3x} \right]_1^2 \\ &= \frac{2}{3} (e^6 - e^3) \\ &= \frac{2e^3}{3} (e^3 - 1)\end{aligned}$$

$$\begin{aligned}\int_1^e \frac{\ln t}{t} dt &= \left[ \frac{(\ln t)^2}{2} \right]_1^e \\ &= \frac{1}{2}\end{aligned}$$

$$\begin{aligned}\int_1^2 (x+1) \ln x dx &= \left[ \left( \frac{x^2}{2} + x \right) \ln x \right]_1^2 - \int_1^2 \left( \frac{x}{2} + 1 \right) dx \\ &= \left[ \left( \frac{x^2}{2} + x \right) \ln x - \frac{x^2}{4} - x \right]_1^2 \\ &= (4 \ln 2 - 3) - \left( -\frac{1}{4} - 1 \right) \\ &= 4 \ln 2 - \frac{7}{4}\end{aligned}$$

$$\begin{aligned}\int_0^3 \frac{5}{\sqrt{2x+3}} dx &= 5 \int_0^3 \frac{2}{2\sqrt{2x+3}} dx \\ &= 5 \left[ \sqrt{2x+3} \right]_0^3 \\ &= 5(3 - \sqrt{3}) \\ &= 15 - 5\sqrt{3}\end{aligned}$$

$$\begin{aligned}u(x) &= \ln x & u'(x) &= \frac{1}{x} \\ v(x) &= \frac{x^2}{2} + x & v'(x) &= x + 1\end{aligned}$$

$$\begin{aligned} \int_0^{\frac{\pi}{2}} \frac{\sin x \cos x}{\cos^2 x + 1} dx &= \frac{1}{-2} \int_0^{\frac{\pi}{2}} \frac{-2 \sin x \cos x}{\cos^2 x + 1} dx \\ &= \frac{1}{-2} \left[ \ln |\cos^2(x) + 1| \right]_0^{\frac{\pi}{2}} \\ &= \frac{1}{-2} \left[ \ln(\cos^2(x) + 1) \right]_0^{\frac{\pi}{2}} \\ &= \frac{\ln(2)}{2} \end{aligned}$$

$$\begin{aligned} \int_1^2 \frac{2}{(3u-1)^2} du &= \frac{2}{3} \int_1^2 (3)(3u-1)^{-2} du \\ &= \frac{2}{3} \left[ \frac{(3u-1)^{-2+1}}{-2+1} \right]_1^2 \\ &= -\frac{2}{3} \left[ \frac{1}{(3u-1)} \right]_1^2 \\ &= -\frac{2}{3} \left( \frac{1}{5} - \frac{1}{2} \right) \\ &= \frac{1}{5} \end{aligned}$$

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$$\begin{aligned} \int_1^e \frac{\ln x}{x^2} dx &= \left[ -\frac{1}{x} \ln x \right]_1^e - \int_1^e -\frac{1}{x^2} dx \\ &= \left[ -\frac{1}{x} \ln x - \frac{1}{x} \right]_1^e \\ &= -\frac{2}{e} + 1 \end{aligned}$$

$$u(x) = \ln x$$

$$u'(x) = \frac{1}{x}$$

$$v(x) = -\frac{1}{x}$$

$$v'(x) = \frac{1}{x^2}$$

$$\begin{aligned} \int_{-2}^0 (2x^3 - x + 1) dx &= \left[ \frac{1}{2} x^4 - \frac{x^2}{2} + x \right]_{-2}^0 \\ &= -4 \end{aligned}$$

قم بالتمرين على باقي التمارين