



Exercice 1

Calculer les intégrales suivantes :

$$1) I_1 = \int_0^4 x^4 dx ; I_2 = \int_0^1 (x^2 + 3x + 2) dx ; I_3 = \int_1^2 \frac{1}{x^4} dx ; I_4 = \int_1^2 x^{\frac{3}{2}} dx ; I_5 = \int_1^2 \sqrt[4]{x^3} dx ; I_6 = \int_1^2 x^{-\frac{2}{3}} dx .$$

$$2) I_2 = \int_0^1 \frac{1}{x+1} dx ; I_3 = \int_0^1 \frac{1}{2x+1} dx ; I_4 = \int_0^1 \frac{x}{x^2+1} dx ; I_5 = \int_{\frac{\pi}{4}}^{\frac{\pi}{3}} \frac{\cos x}{\sin x} dx ; I_6 = \int_0^1 \frac{x^2}{x^3+2} dx ;$$

$$I_7 = \int_0^1 \frac{e^x}{e^x+1} dx ; I_8 = \int_0^1 \frac{x^2+1}{x^3+3x+1} dx ; I_9 = \int_{\sqrt{e}}^e \frac{1}{x \ln x} dx .$$

$$3) I_1 = \int_1^2 \frac{x+1}{x} dx ; I_2 = \int_0^1 \frac{x^2+3x+2}{x+2} dx ; I_3 = \int_0^1 \frac{2x-1}{x+1} dx ; I_4 = \int_0^1 \frac{2}{(x+1)(x-3)} dx ;$$

$$I_5 = \int_0^1 \frac{x}{(x-2)(x+2)} dx ; I_6 = \int_{-1}^0 \frac{2x-1}{(x-1)(x+3)} dx ; I_7 = \int_0^1 \frac{x+1}{x^2+5x+6} dx ; I_8 = \int_0^1 \frac{3}{x^2+3x+2} dx ;$$

$$I_9 = \int_0^1 \frac{x^2+x+1}{x^2+4x+3} dx ; I_{10} = \int_1^2 \frac{1-x}{x(x^2-9)} dx .$$

$$4) I_2 = \int_0^1 -\frac{2x}{(x^2+1)^2} dx ; I_3 = \int_0^1 -\frac{3x^2+2x+1}{(x^3+x^2+x+2)^2} dx ; I_4 = \int_0^1 \frac{2x+1}{(x^2+x+3)^2} dx ; I_5 = \int_{\frac{\pi}{4}}^{\frac{\pi}{3}} \frac{\sin x}{\cos^2 x} dx ;$$

$$I_6 = \int_0^1 \frac{2e^x}{(e^x+2)^2} dx ; I_7 = \int_{\sqrt{e}}^e \frac{1}{x(\ln x)^2} dx ; I_8 = \int_0^1 \frac{1}{2(x+1)\sqrt{x+1}} dx ; I_9 = \int_1^2 \frac{3}{\sqrt{x^3}} dx .$$

$$5) I_2 = \int_0^1 \frac{1}{2\sqrt{x+1}} dx ; I_3 = \int_0^1 \frac{x}{\sqrt{x^2+1}} dx ; I_4 = \int_0^1 \frac{3x}{\sqrt{2x^2+3}} dx ; I_5 = \int_0^{\frac{\pi}{2}} \frac{\sin x \cos x}{\sqrt{1+\cos^2 x}} dx ;$$

$$I_7 = \int_1^e \frac{\ln x}{x\sqrt{1+\ln^2 x}} dx ; I_8 = \int_e^{e^2} \frac{1}{x\sqrt{2+\ln x}} dx .$$

$$6) I_1 = \int_0^{\frac{\pi}{3}} \sin x (\cos x)^2 dx ; I_3 = \int_0^1 x(x^2+1)^5 dx ; I_4 = \int_1^e \frac{(\ln x)^4}{x} dx ; I_5 = \int_0^1 x(\sqrt{x^2+1})^3 dx ;$$

$$I_6 = \int_0^{\ln 2} e^{2x} (e^{2x}+1)^3 dx .$$

$$7) I_1 = \int_0^{\frac{\pi}{3}} \cos\left(2x + \frac{\pi}{3}\right) dx ; I_2 = \int_0^{\frac{\pi}{3}} \sin\left(3x - \frac{\pi}{3}\right) dx ; I_3 = \int_0^{\frac{\pi}{3}} \cos^3 x dx ; I_4 = \int_0^{\frac{\pi}{4}} \cos^4 x dx ;$$

$$I_5 = \int_0^{\frac{\pi}{2}} \cos^5 x dx ; I_6 = \int_0^{\frac{\pi}{3}} \sin^2 x dx ; I_7 = \int_0^{\frac{\pi}{2}} \sin^3 x dx ; I_8 = \int_0^{\frac{\pi}{2}} \sin^4 x dx .$$

Exercice 2

En utilisant une intégration par parties, calculer les intégrales suivantes :

$$I_1 = \int_0^{\frac{\pi}{3}} x \cos x dx ; I_2 = \int_0^{\frac{\pi}{2}} x \sin x dx ; I_3 = \int_1^e x \ln x dx ; I_4 = \int_1^e \ln x dx ; I_5 = \int_1^e \frac{\ln x}{\sqrt{x}} dx ;$$

$$I_6 = \int_0^1 x \ln(x+1) dx ; I_7 = \int_0^{\frac{\pi}{3}} x^2 \cos\left(4x + \frac{\pi}{3}\right) dx ; I_8 = \int_0^1 \ln(x + \sqrt{x^2+1}) dx ; I_9 = \int_0^1 (2x+3) \ln(x+1) dx ;$$

$$I_{10} = \int_{\sqrt{e}}^e \frac{x \ln x}{(x^2+1)^2} dx ; I_{11} = \int_0^1 x e^x dx ; I_{12} = \int_0^1 x e^{2x-1} dx ; I_{13} = \int_{-\ln 2}^0 (x+1) e^{-x} dx ;$$

$$I_{14} = \int_0^{\ln x} (x^2+1) e^{2x} dx ; I_{15} = \int_{\frac{1}{2}}^1 \frac{x}{\sqrt{1+2x}} dx ; I_{16} = \int_{-\ln 2}^0 e^{-x} \ln(1+2e^x) dx .$$



Exercice 3

Calculer les intégrales suivantes :

$$J_1 = \int_0^5 |x-2| dx ; \quad J_2 = \int_0^3 |(x-1)(x+2)| dx ; \quad J_3 = \int_{-3}^{-1} \frac{|x+2|}{(x^2 + 4x)} dx ; \quad J_4 = \int_2^5 |x^2 - 3x - 4| dx ;$$

$$J_5 = \int_0^{\sqrt{\ln 2}} xe^{-x^2} dx ; \quad J_6 = \int_{\ln 2}^{\ln 3} \frac{e^x - e^{-x}}{e^x + e^{-x}} dx ; \quad J_7 = \int_0^1 \sqrt{3x+2} dx ; \quad J_8 = \int_1^e \frac{\ln^3 x}{x} dx ;$$

