# Series N 1

**Exercice 1:**

Calculate the following integrals:

$$\int_0^{\pi/3} \operatorname{tg} x\, dx \qquad \int \frac{2x\cos[\ln(x^2+1)]}{x^2+1}dx \qquad \int_0^1 xe^x dx \qquad \int \frac{dx}{1+\sqrt{x}}$$

$$\int_0^1 \frac{x^2}{x+3}dx \qquad \int_0^1 \frac{x\, dx}{\sqrt{1+x}} \qquad \int_1^2 \frac{(\ln x)^2}{x}dx$$

**Exercice 2:**

Determine a simple equivalent of the following sums of Riemann:

$$\sum_{k=1}^{n} \frac{1}{2n+k} \qquad \sum_{k=1}^{n} \frac{1}{\sqrt{n^2+2kn}} \qquad \sum_{k=1}^{n} \frac{k}{n^2+k^2}$$

Calculate the following limits:

$$\lim_{n\to+\infty} \sum_{k=1}^{n} \frac{n}{n^2+k^2} \qquad \lim_{n\to+\infty} \sum_{k=1}^{n} \frac{1}{3+k}$$

**Exercice 3**

Calculate the following double integrals:

$$\iint_D x\, dxdy \qquad D = \{(x,y)\epsilon R^2 \ /\ x \geq 0\ ;\ y \geq x\ ;\ x+y \leq 2\}$$

$$\iint_\Omega xy^2\, dxdy \qquad \Omega = \{(x,y)\epsilon R^2 \ /\ 1 \geq |x|\ ;\ y \in [0,2]\}$$

$$\iint_\phi \frac{dxdy}{\sqrt{x^2+y^2}} \qquad \phi = \{(x,y)\epsilon R^2 /\ 1 \leq x^2+y^2 \leq 4\}$$

**Exercice 4:**

Calculate the area of the domain ***A***, delimited by the curves:

$$y = 8/x,\ y = x-1 \text{ et } x = 1.$$

Calculate the area of the domain ***A***, delimited by the curves:

$$y = x^2 \text{ et } y = 1-x^2.$$

**Exercice 5:**

Calculate the following triple integral:

$$J_1 = \iiint_D (x+y+z)\, dxdydz \text{ où } D = \{(x,y,z) \in \mathbb{R}^3/0 < x < 1,\ 0 < y < x,\ 0 < z < y\}.$$

$$J_2 = \iint_D \frac{dxdydz}{\sqrt{x^2+y^2+z^2}} \text{ où } D = \{(x,y,z) \in \mathbb{R}^2/\ x^2+y^2+z^2 \leq 1\} \text{ (ind. coord.sphériques)}$$