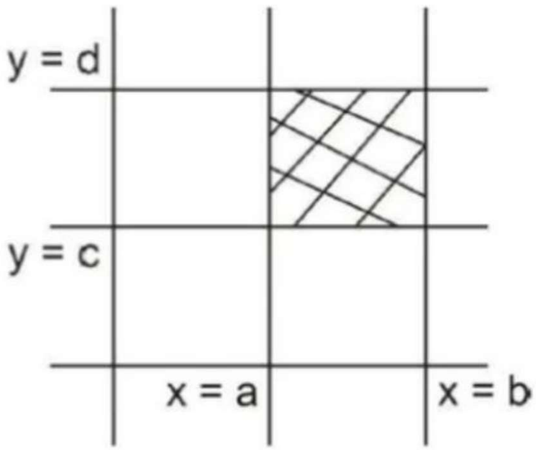
Double Integrals over a rectangular region :

If f(x, y) is continuous over the rectangle R : $a \le x \le b$, $c \le y \le d$, then the double integral.



$$\iint_R f(x,y)dA = \int_a^b \int_c^d f(x,y)dydx$$

Also, $\iint_R f(x,y)dA = \int_c^d \int_a^b f(x,y)dxdy$

Q.1. The value of $\iint_A (x^2 + y^2)\,dA$, where A is rectangle $2 \le x \le 4$ & $0 \le y \le 1$

(a) 57/6 (b) 58/3

(c) 58/7 (d) None of these

Double integration over mix region :

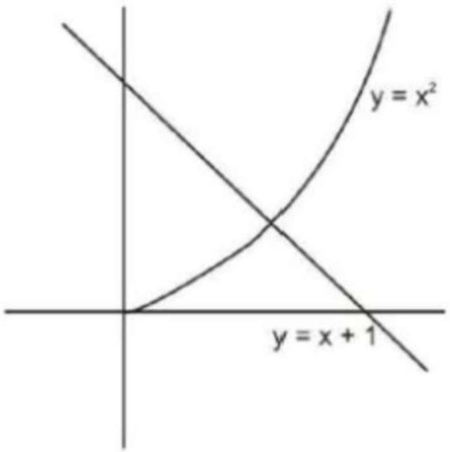
(a) **Simple region :** A region in which strip moves only on two curve, then this region is called simple region.

(b) **Mix region :** A region in which the strip moves on more than two curves, then this region is called mix region.

Procedure of double integration over mix region :

Step – 1 : Trace the region

Example :



Step – 2 : Divide into parts and all parts are simple region.

Step – 3 : Integrate over all simple region and sum of all quantities.

Q.2. The value of integral $\int_{-1}^{1}\int_{-1}^{1} |x+y|\,dx\,dy$ is **IIT JAM – 2019**

(a) 1.79 (b) 1

(c) 4.39 (d) 2.66

Q.3. The value of $\iint_R \cos(\max\{x^3, y^{3/2}\})dxdy$, where $R = [0, 1] \times [0, 1]$. **JAM – 2009**

(a) sin 2 (b) sin 3

(c) sin 1 (d) None

Q.4. Evaluate $\int_{\pi/2}^{\pi}\int_{0}^{x}\frac{\sin x}{x}\,dy\,dx$

(a) 0 (b) 1

(c) 2 (d) -1

Q.5. The value of the integral $\int_0^1 \int_0^1 \left(x^2 + y^2\right) dx dy$ **BHU 2012**

(a) 1 (b) 0

(c) ½ (d) 2/3

Q.6. Evaluate $\int_0^1 \int_0^1 \left(2x^3 e^{x^2 y}\right) dy\,dx$ **JNU 2021**

(a) $e^2 - e - 2$ (b) $e^2 - 2$

(c) $e - 2$ (d) 0

Q.7 The value of integral $\int_0^3 \int_0^{\sqrt{3}x} \frac{dy\,dx}{\sqrt{x^2+y^2}}$ .JAM-2008

(a) $3\log(\sqrt{3}-2)$ (b) $\log(\sqrt{3}+2)$

(c) $3\log(\sqrt{3}+2)$ (d) $-3\log(\sqrt{3}+2)$

Q.8. The value of the integral $\iint_D \frac{\sin(2x)}{x}\,dxdy$ .where D denotes the region bounded by the x – axis and the lines y = x and x = 1.**IIT JAM 2007**

(a) $-\frac{\cos 2}{2}+\frac{1}{2}$ (b) $\frac{\cos 2}{2}$

(c) cos2 (d) sin 2