



## UNIT 5 - Multiple Integrals

Application of double integration:

$$\text{Area} = \iint dx dy \quad (\text{or}) \quad \iint dy dx$$

1. Evaluate  $\iint dx dy$  over the region bounded by

$$x=0, x=2, y=0, y=2$$

Solution:-

$$\text{Area} = \iint dx dy = \int_0^2 \int_0^2 dx dy$$

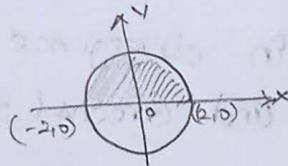
$$= \int_0^2 [x]_0^2 dy$$

$$= 2 \int_0^2 dy = 2 [y]_0^2$$

$$= 2[2-0]$$

$$\text{Area} = 4 \text{ square units}$$

2) Evaluate  $\iint_R dx dy$  where R is the shaded region in the figure



Solution :-

$$\iint_R dx dy = \text{Area of the shaded Region}$$

$$= \text{Area of the semicircle}$$

$$= \frac{1}{2} \pi r^2$$

$$= \frac{1}{2} \pi (2)^2$$

$$\text{Area} = 2\pi \text{ sq. units}$$