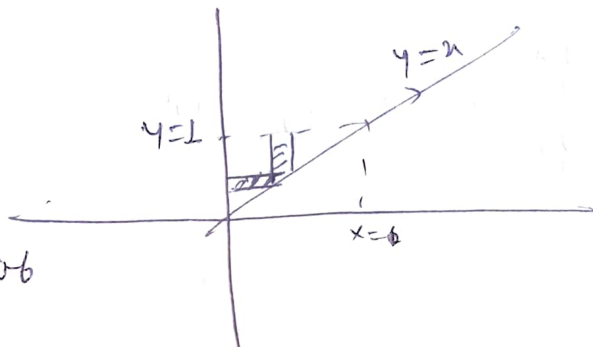


$$\int_{x=0}^{x=1} \int_{y=x}^{y=1} \sin(y^2) dy dx$$



by changing the order of
integration

$$\int_{x=0}^{x=y} \int_{y=0}^{y=1} \sin(y^2) dx dy = \int_{y=0}^{y=1} \int_{x=0}^{x=y} \sin(y^2) dx dy$$

$$= \int_0^1 \left\{ \int_{x=0}^y \sin(y^2) dx \right\} dy$$

$$= \int_0^1 \left\{ \sin(y^2) \int_{x=0}^{x=y} 1 \cdot dx \right\} dy$$

$$= \int_0^1 \sin(y^2) (x)_0^y dy$$

$$= \int_0^1 \sin(y^2) (y-0) dy$$

$$= \int_0^1 y \sin(y^2) dy$$

put $y^2 = t \Rightarrow 2y dy = dt \Rightarrow y dy = \frac{dt}{2}$

$$= \frac{1}{2} \int_0^1 \sin t dt = \frac{1}{2} (-\cos t)_0^1 = \frac{1 - \cos 1}{2} \text{ Ans}$$