① $$f_{xy}(x,y) = \begin{cases} e^{-x-y} & ; 0<x<\infty, 0<y<\infty \\ 0 & ; \text{elsewhere} \end{cases}$$

what is $P(X<Y)$?

Soln :-

$$P(X<Y) = \int_0^{\infty}\int_0^{Y} f_{xy}(x,y)\,dx\,dy$$

$$= \int_0^{\infty}\int_0^{Y} e^{-x-y}\,dx\,dy$$

$$= \int_0^{\infty} \left(-e^{-x-y} + c_1\right) dy$$

$$\boxed{P(X<Y) = e^{-x-y} + c_1 y + c_2}$$