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

$$P(x < Y) = \int_0^\infty \int_0^Y e^{(-x-y)} \, \partial x \, \partial y$$

$$= \int_0^\infty \left. \frac{e^{-x-y}}{-1} \right]_0^Y \partial y$$

$$= \int_0^\infty \frac{e^{-2y}}{-1} - \frac{e^{-y}}{-1} \, \partial y$$

$$= \int_0^\infty \left(-e^{-2y} + e^{-y} \right) dy$$

$$= \left. +\frac{e^{-2y}}{2} - e^{-y} \right]_0^\infty$$

Upper limit Vanishes the exponentials to Zero

$\Rightarrow$ applying lower $= -\frac{1}{2} + 1$

$$\boxed{P(x<Y) = 0.5}$$