

Example of jointly distributed Gamma random variables

Suppose X and Y have joint density $f_{X,Y}(x,y) = \frac{8575}{2} x y^2 e^{-5x-7y}$ for $x > 0$
 $= 0$ otherwise for $y > 0$

Find the density of X and the density of Y .

$$\frac{8575}{2} x y^2 e^{-5x-7y}$$

$$\square x e^{-5x} \cdot \square y^2 e^{-7y}$$

1 way to find these constants is
 Similarly for the y constant.

$$\int_0^{\infty} \square x e^{-5x} dx = 1 \text{ solve for } \square$$

Other way is to read the structure:

$$\frac{5^2}{1!} x e^{-5x} \quad 5 = \lambda \quad 1 = r-1$$

$$\text{So } f_X(x) = \frac{5^2}{1!} x e^{-5x} \text{ for } x > 0$$

$$= 0 \text{ otherwise}$$

$$\text{Similarly: } \frac{7^3}{2!} y^2 e^{-7y} \quad \lambda = 7 \quad r-1 = 2$$

$$\text{So } f_Y(y) = \frac{7^3}{2!} y^2 e^{-7y} \text{ for } y > 0$$

$$= 0 \text{ otherwise.}$$