Dear Student,

Here first we calculate k as:

$$K = \int_0^{10}\int_0^{10} (2x + y)\ \ \mathrm{dx}\ \ \mathrm{dy}$$

$$K = 1500$$

In MATLAB, **dblquad** function is used for above double integral.

To calculate $f_X(x)$ we take integral of $f_{XY}(x, y)$ w.r.t. y as:

$$f_X(x) = \int_0^{10} \frac{(2x + y)}{1500}\ \mathrm{dy} = \frac{x}{75} + \frac{1}{30}$$

To calculate $f_Y(y)$ we take integral of $f_{XY}(x, y)$ w.r.t. x as:

$$f_Y(y) = \int_0^{10} \frac{(2x + y)}{1500}\ \mathrm{dx} = \frac{y}{150} + \frac{1}{15}$$

For $f_{XY}(x,y) = K(e^{-\alpha x2}\ e^{-\beta y2}\ e^{-\gamma xy})$

Here, the joint pdf of two television sets is modified such that individual marginal densities cannot be separated. This is done by the addition of the $e^{-\gamma xy}$ factor. Here, as the three term are multiplying their powers are added as:

$$Ke^{-(\alpha x2\ +\ \beta y2\ +\ \gamma xy)}$$