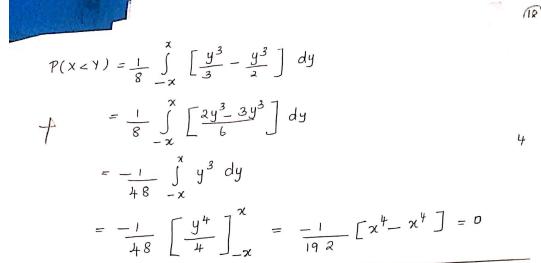


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The joint p.d.f x and y is given by,
$$f(x,y) = \begin{cases} K(6-x-y), & 0 < x < a, a < y < 4 \\ & 0, & \text{otherwise}. \end{cases}$$
(i) Find  $K(ii)$   $P(X < 1 \cap Y < 3)$  (iii)  $P(X < 1 \mid Y < 3)$ 
(iv)  $P(X + Y < 3)$ .

Solution:
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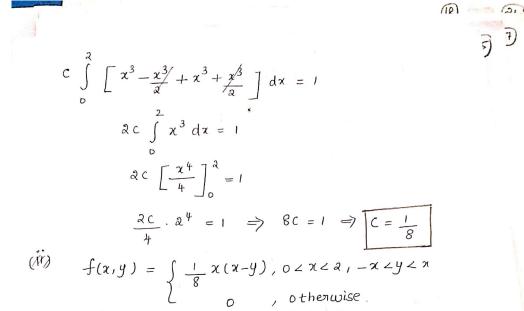
$$0 =$$



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(ii) Marginal pdf of 'x' is,
$$f_{x}(x) = f(x) = \int_{-\infty}^{\infty} f(x,y) dy$$

$$= \int_{-x}^{x} \frac{1}{8} x(x-y) dy$$

$$= \frac{1}{8} \int_{-x}^{x} (x^{2} - xy) dy$$

$$= \frac{1}{8} \left[ x^{2}y - \frac{xy^{2}}{2} \right]_{-x}^{x}$$

$$= \frac{1}{8} \left[ x^{3} - \frac{x^{3}}{2} + x^{3} + \frac{x^{3}}{2} \right]$$

$$= \frac{1}{8} x 2 x^{3}$$

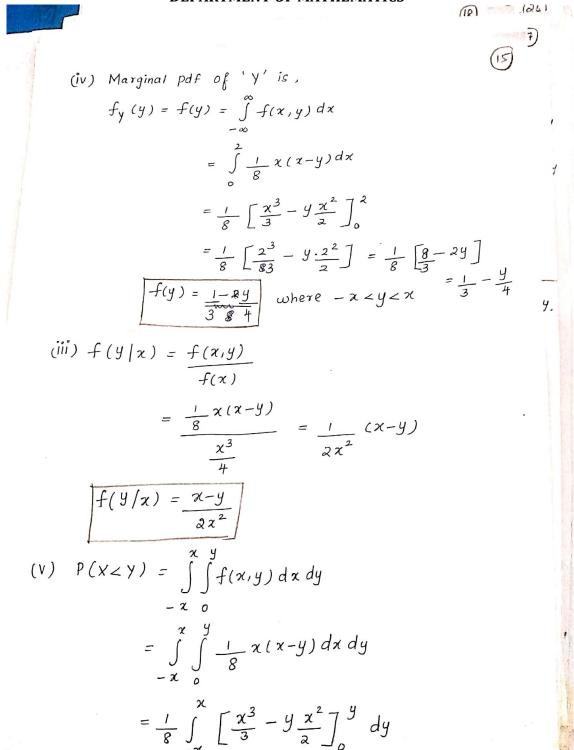
$$f(x) = \frac{x^{3}}{8} \text{ where } 0 < x < 2$$



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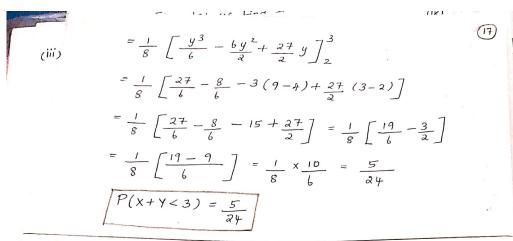




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8) If the joint distribution function of x and y is given by.  

$$F(x,y) = (1-e^{-x})(1-e^{-y}) \text{ for } x>0, y>0$$

= 0 , otherwise

(i) Find the marginal densities of X and Y.

(ii) Are X and Y independent.

Solution:

Given: 
$$F(x,y) = (1-e^{-x})(1-e^{-y})$$
  
=  $1-e^{-x}-e^{-x}+e^{-(x+y)}$ 

The joint pdf is given by,

$$f(x,y) = \frac{\partial^2 F(x,y)}{\partial x \partial y}$$

$$= \frac{\partial^2}{\partial x \partial y} \left[ 1 - e^{-x} - e^{-y} + e^{-(x+y)} \right]$$

$$= \frac{\partial}{\partial x} \left[ 0 - o + e^{-y} - e^{-(x+y)} \right]$$