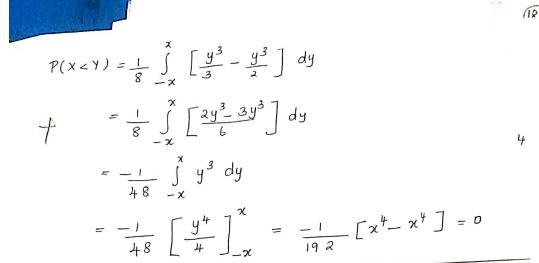


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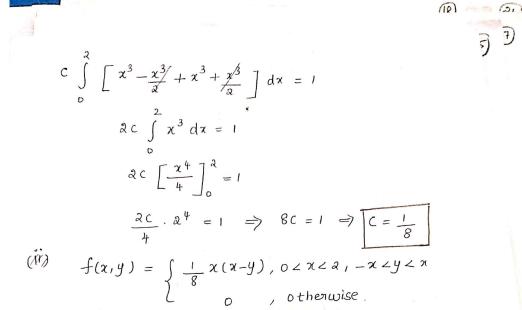




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(ii) Marginal pdf of 'x' is,
$$f_{x}(x) = f(x) = \int_{-\infty}^{\infty} f(x,y) dy$$

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

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

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

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

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

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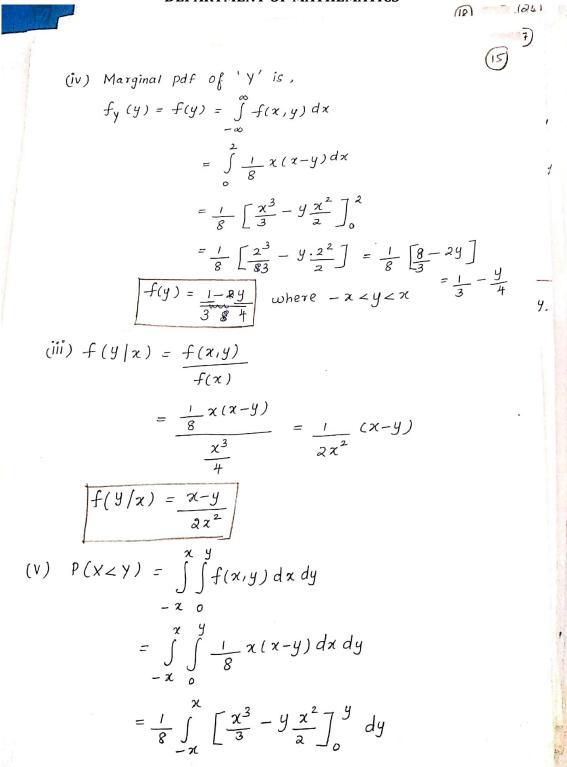
$$= \frac{1}{8} \times 2x^{3}$$
where  $0 < x < a$ 



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(iii) 
$$= \frac{1}{8} \left[ \frac{y^3}{6} - \frac{by^2}{2} + \frac{27}{2} y \right]_2^3$$

$$= \frac{1}{8} \left[ \frac{27}{6} - \frac{8}{6} - 3(9 - 4) + \frac{27}{2} (3 - 2) \right]$$

$$= \frac{1}{8} \left[ \frac{27}{6} - \frac{8}{6} - 15 + \frac{27}{2} \right] = \frac{1}{8} \left[ \frac{19}{6} - \frac{3}{2} \right]$$

$$= \frac{1}{8} \left[ \frac{19 - 9}{6} \right] = \frac{1}{8} \times \frac{10}{6} = \frac{5}{24}$$

$$= \frac{5}{24}$$

8) If the joint distribution function of x and y is given by, 
$$F(x,y) = (1-e^{-x})(1-e^{-y}) \text{ for } x>0, y>0$$

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

(ii) Are 
$$X$$
 and  $Y$  independent (iii)  $P(1 < X < 3)$ ,  $1 < Y < 2$ )

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

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

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

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