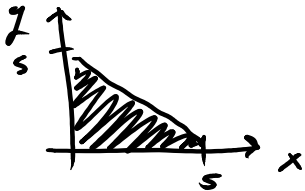


Example Say X, Y have joint density $f_{X,Y}(x,y) = \frac{2}{25}$ for $0 < x, 0 < y$
and $x+y \leq 5$
= 0 otherwise



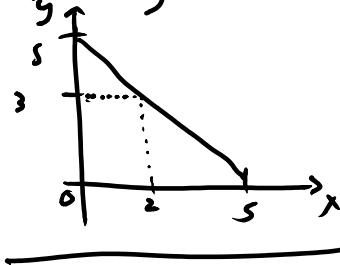
Find conditional density of X , given $Y=3$.

$$f_{X|Y}(x|3) = \frac{f_{X,Y}(x,y)}{f_Y(3)} = \frac{2/25}{4/25} = \frac{2}{4} = \frac{1}{2} \quad 0 < x < 2$$

$$f_Y(3) = \int f_{X,Y}(x,y) dx = \int_0^2 \frac{2}{25} dx = \frac{2}{25} x \Big|_{x=0}^2 = \frac{4}{25}$$

Check: This is a valid density:

$$\int_0^2 f_{X|Y}(x|3) dx = \int_0^2 \frac{1}{2} dx = 1 \quad \checkmark$$



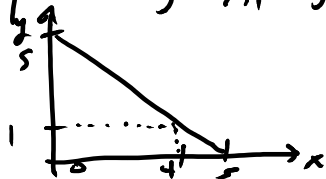
Find conditional density of X , given $Y=1$.

$$f_{X|Y}(x|1) = \frac{f_{X,Y}(x,y)}{f_Y(1)} = \frac{2/25}{8/25} = \frac{1}{4} \quad 0 < x < 4.$$

$$f_Y(1) = \int f_{X,Y}(x,y) dx = \int_0^4 \frac{2}{25} dx = \frac{2}{25} x \Big|_{x=0}^4 = \frac{8}{25}$$

Again: Check that this is a valid density:

$$\int_0^4 \frac{1}{4} dx = 1 \quad \checkmark$$



$$[\text{i.e. } \frac{2}{25} (\text{length } [0,4]) = \frac{2}{25} \cdot 4 = \frac{8}{25}]$$