

Joint pdf of r.v. X & Y is

$$P_{xy}(x, y) = \begin{cases} 2(1-x) & 0 < x \leq 1 \quad 0 \leq y \leq 1 \\ 0 & \text{otherwise} \end{cases}$$

Determine the pdf of $Z = XY$

let

$$Z = XY$$

$$W = X$$

$$\left. \begin{array}{l} Z = XY \\ W = X \end{array} \right\}$$
$$\Rightarrow$$

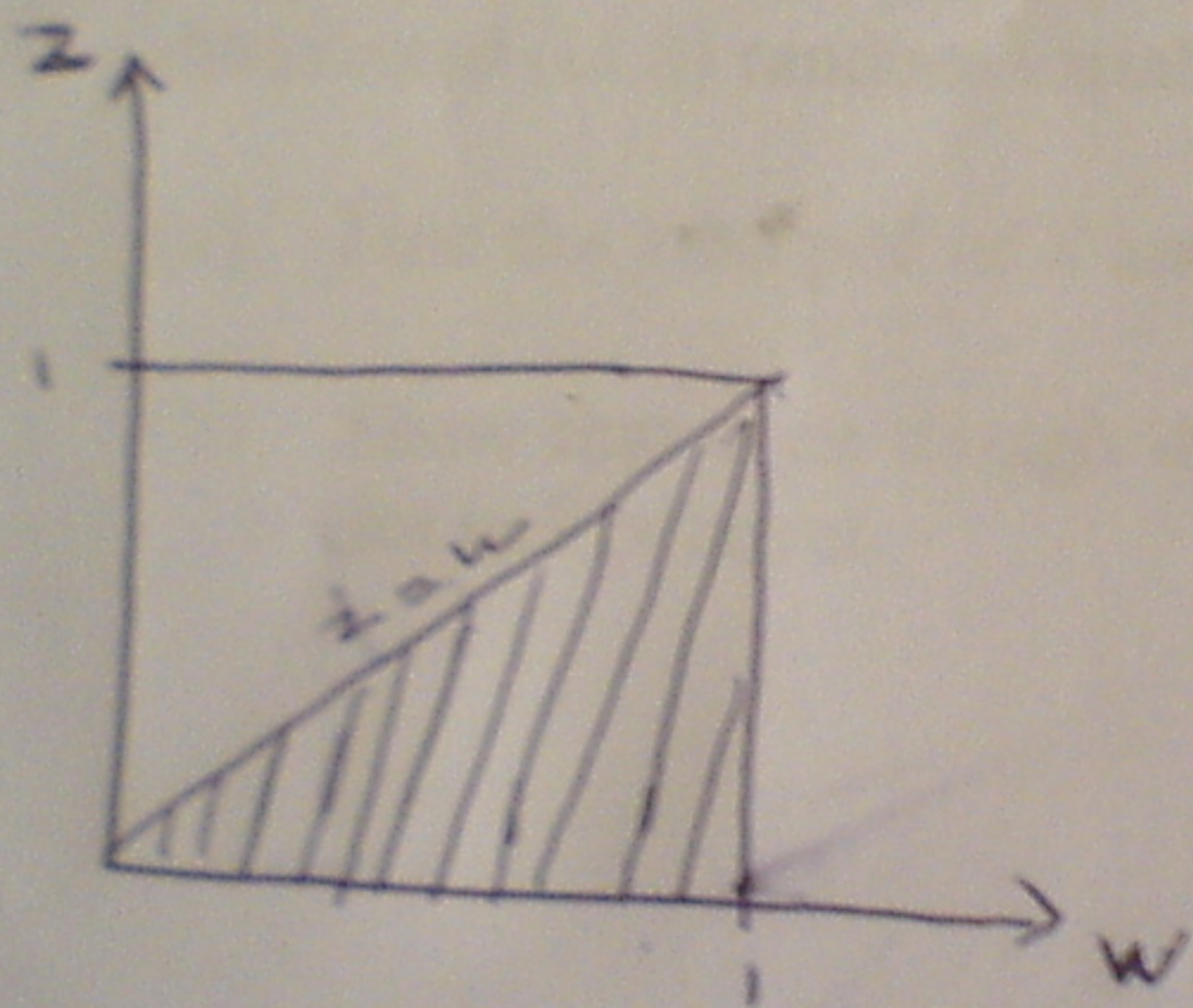
$$X = W$$

$$Y = \frac{Z}{W}$$

$$J(z, w) = \begin{vmatrix} \frac{\partial x}{\partial z} & \frac{\partial x}{\partial w} \\ \frac{\partial y}{\partial z} & \frac{\partial y}{\partial w} \end{vmatrix} = -\frac{1}{w}$$

$$\therefore f(z, w) = |j(z, w)| f(u, y)$$

$$f(z, w) = \begin{cases} \frac{1}{w} 2(1-w) & 0 \leq u \leq 1 \quad 0 < y \leq 1 \\ 0 & \text{otherwise} \end{cases}$$



$$f(z) = \int f(z, w) dw$$

$$= \int \frac{1}{w} 2(1-w) dw \quad ?$$