

Taller 4: Probabilidad combinada

1. Se selecciona al azar 2 estudiantes de un salón que contiene 3 estudiantes de sistemas, 2 de electrónica y 3 de industrial.

Si x es el número de estudiantes de sistemas, y y el de electrónica, hallar:

a) La función de probabilidad conjunta

b) $P(x, y) \in R$, tal que $R = \{(x, y) / x + y \leq 2\}$

a) 2 Sistemas

$$P(2, 0) = \frac{\binom{3}{2}}{\binom{8}{2}} = \frac{3}{28}$$

$$P(0, 2) = \frac{\binom{2}{2}}{\binom{8}{2}} = \frac{1}{28}$$

$$P(1, 1) = \frac{\binom{3}{1} \binom{2}{1}}{\binom{8}{2}} = \frac{3 \cdot 2}{28} = \frac{6}{28}$$

$$P(1, 0) = \frac{\binom{3}{1} \binom{2}{0}}{\binom{8}{2}} = \frac{3}{28}$$

$$P(0, 1) = \frac{\binom{2}{1} \binom{3}{0}}{\binom{8}{2}} = \frac{2}{28}$$

$$P(0, 0) = \frac{\binom{3}{0} \binom{2}{0}}{\binom{8}{2}} = \frac{1}{28}$$

Función Probabilística

$X \backslash y$	0	1	2
0	$\frac{1}{28}$	$\frac{2}{28}$	$\frac{1}{28}$
1	$\frac{3}{28}$	$\frac{2}{28}$	\otimes
2	$\frac{3}{28}$	\otimes	\otimes

$$P(x, y) = \frac{\binom{3}{x} \binom{2}{y} \binom{3}{2-x-y}}{\binom{8}{2}}$$

$$\{x \leq 2, 0 \leq y \leq 2, x + y \leq 2\}$$

b) $R = \{(x, y) / x + y \leq 1\}$
 $P(0, 1), P(0, 0), P(1, 0)$

$x \backslash y$	0	1	2
0	$\frac{3}{28}$	$\frac{6}{28}$	0
1	$\frac{9}{28}$	\otimes	\otimes
2	0	\otimes	\otimes

$$F(x, y) \begin{cases} \frac{2}{5}(2x+3y), & 0 \leq x, y \leq 1 \\ 0, & \text{otro caso} \end{cases}$$

a) f_{xy} es prob conjunta

b) $P(x, y) \in \mathbb{R} \mid (x, y) \mid 0 < x < y < 2$

$$\frac{2}{5} \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} 2x + 3y \, dx \, dy \rightarrow \frac{2}{5} \int_0^1 \int_0^1 2x + 3y \, dx \, dy$$

$$\frac{2}{5} \int_0^1 x^2 + 3y \Big|_0^1 \, dy \rightarrow \frac{2}{5} \int_0^1 1 + 3y \, dy \rightarrow \frac{2}{5} \left(y + \frac{3}{2} y^2 \right) \Big|_0^1$$

$$\frac{2}{5} \left(1 + \frac{3}{2} \right) \rightarrow 1 \rightarrow f_{xy} \text{ es de prob conjunta}$$

$$-P(x, y) \in \mathbb{R} \mid R \in (x, y) \quad 0 < x < \frac{1}{2}, \frac{1}{4} < y < \frac{1}{2}$$

$$\frac{2}{5} \int_{1/4}^{1/2} \int_0^{1/2} 2x + 3y \, dx \, dy \rightarrow \frac{2}{5} \left(\frac{y^3}{1} + \frac{3y^3}{6} \right) \Big|_{1/4}^{1/2} = \frac{2}{5} \left(\frac{y^3 + 6y^3}{4} \right) \Big|_{1/4}^{1/2}$$

$$\frac{7}{30} \left(\frac{1}{8} - \frac{1}{64} \right) = \frac{49}{1920}$$