

**VARIABLES ALEATORIAS BIDIMENSIONALES****Ejercicio 1.**

- a.  $c = \frac{1}{42}$
- b.  $P(X \leq 2.5) = g(0) + g(1) + g(2) = 1$
- c.  $P(X = 2, Y = 1) = f(2, 1) = \frac{5}{42}$
- d.  $P(X \geq 1, Y \leq 2) = f(1, 0) + f(1, 1) + f(1, 2) + f(2, 0) + f(2, 1) + f(2, 2) = \frac{4}{7}$

**Ejercicio 2.**

- a.  $k = \frac{6}{5}$
- b.  $g(x) = \frac{6}{5} \left(x + \frac{1}{3}\right)$  si  $0 \leq x \leq 1$ ;  $h(y) = \frac{6}{5} \left(\frac{1}{2} + y^2\right)$  si  $0 \leq y \leq 1$ .  
 $g(x) \cdot h(y) \neq f(x, y)$  No son variables aleatorias independientes.
- c.  $P(Y < 0.5) = \int_0^{0.5} h(y) dy = \frac{7}{20}$
- d.  $P(Y > 0.75 | X = 0.5) = \int_{0.75}^1 f(y | x = 0.5) dy = \int_{0.75}^1 \frac{6}{5} \left(\frac{1}{2} + y^2\right) dy = \frac{61}{160}$

**Ejercicio 3.**

- a.  $P(X = 2, Y = 3) = f(2, 3) = 0.04$
- b.  $P(Y > X) = f(0, 1) + f(0, 2) + f(0, 3) + f(1, 2) + f(1, 3) + f(2, 3) = 0.12$
- c.

x	0	1	2	3	4	5
$g(x)$	0.03	0.08	0.16	0.21	0.24	0.28

y	0	1	2	3
$h(y)$	0.25	0.26	0.25	0.24

- d. (D.1).  $P(X = 2) = 0.16$  (D.2).  $P(Y = 0) = 0.25$

$$e. G(x) = \begin{cases} 0 & \text{si } x < 0 \\ 0.03 & \text{si } 0 \leq x < 1 \\ 0.11 & \text{si } 1 \leq x < 2 \\ 0.27 & \text{si } 2 \leq x < 3 \\ 0.48 & \text{si } 3 \leq x < 4 \\ 0.72 & \text{si } 4 \leq x < 5 \\ 1 & \text{si } x \geq 5 \end{cases} ; H(y) = \begin{cases} 0 & \text{si } y < 0 \\ 0.25 & \text{si } 0 \leq y < 1 \\ 0.51 & \text{si } 1 \leq y < 2 \\ 0.76 & \text{si } 2 \leq y < 3 \\ 1 & \text{si } y \geq 3 \end{cases}$$

#### Ejercicio 4

- b.  $g(x) = \frac{1}{9}\left(3x - \frac{3}{2}\right)$  si  $1 \leq x \leq 3$ ;  $h(y) = \frac{1}{9}(12 - 2y)$  si  $1 \leq y \leq 2$
- c.  $g(x) \cdot h(y) \neq f(x, y)$  No son variables aleatorias independientes.
- d.  $P(Y > 1.5) = \int_1^{1.5} h(y)dy = \frac{19}{36}$ ;  $P(X < 2) = \int_1^2 g(x)dx = \frac{1}{3}$
- e.  $P(X = 2|Y = 1) = \int_2^3 f(x|y = 1)dx = \int_2^3 \frac{1}{10}(3x - 1)dx = 0.65$

#### Ejercicio 5

- a.  $c = \frac{1}{27}$
- b.  $g(x) = \frac{1}{27}(2x + 4)$  si  $1 \leq x \leq 4$ ;  $h(y) = \frac{1}{27}\left(\frac{15}{2}y + 6\right)$  si  $0 \leq y \leq 2$ ; Son dependientes.
- c.  $P(X > 2; Y < 1) = \frac{7}{27}$
- d.  $P(X > 3) = \frac{11}{27}$  probabilidad de contener más de  $3\mu g$  de magnesio.
- e.  $P(X \leq 2|Y = 1) = \frac{4}{9}$

#### Ejercicio 6

- a.  $c = \frac{1}{36}$
- b.

x	2	4	6	8
$g(x)$	11/36	11/36	6/36	8/36

y	3	4	5
$h(y)$	7/36	10/36	19/36

- c. Son dependientes.
- d.  $H(y) = \begin{cases} 0 & \text{si } y < 3 \\ \frac{7}{36} & \text{si } 3 \leq y < 4 \\ \frac{17}{36} & \text{si } 4 \leq y < 5 \\ 1 & \text{si } y \geq 5 \end{cases}$
- e. (E.1)  $P(Y > X) = \frac{19}{36}$   
(E.2)  $P(X > 4) = \frac{7}{18}$

**Ejercicio 7**

- a.  $P(X < 5; Y > 1) = \frac{65}{168}$
- b.  $g(x) = \frac{1}{84}(4x + 2)$  si  $0 \leq x \leq 6$ ;  $h(y) = \frac{1}{84}(36 + 6y)$  si  $0 \leq y \leq 2$ ; Son dependientes.
- c.  $P(X = 2) = 0$

**Ejercicio 8**

- a.  $c = \frac{1}{3}$
- b.  $P(X = 2; Y \leq 0) = \frac{1}{3}$
- c.

x	1	2
$g(x)$	1/3	2/3

y	-1	0	1
$h(y)$	3/12	4/12	5/12

Son dependientes.

- d.  $P(Y \geq 0) = \frac{3}{4}$

**Ejercicio 9**

- a.  $g(x) = \frac{1}{324}(21x - 3)$  si  $2 \leq x \leq 6$ ;  $h(y) = \frac{1}{324}(32y - 4)$  si  $2 \leq y \leq 5$ ; Son dependientes.
- b.  $P(X \geq 3) = \frac{61}{72}$
- c.  $P(X < 4; Y > 4) = \frac{17}{81}$  probabilidad de que la aleación contenga menos de 4 mg de aluminio y más de 4 mg de cobre.