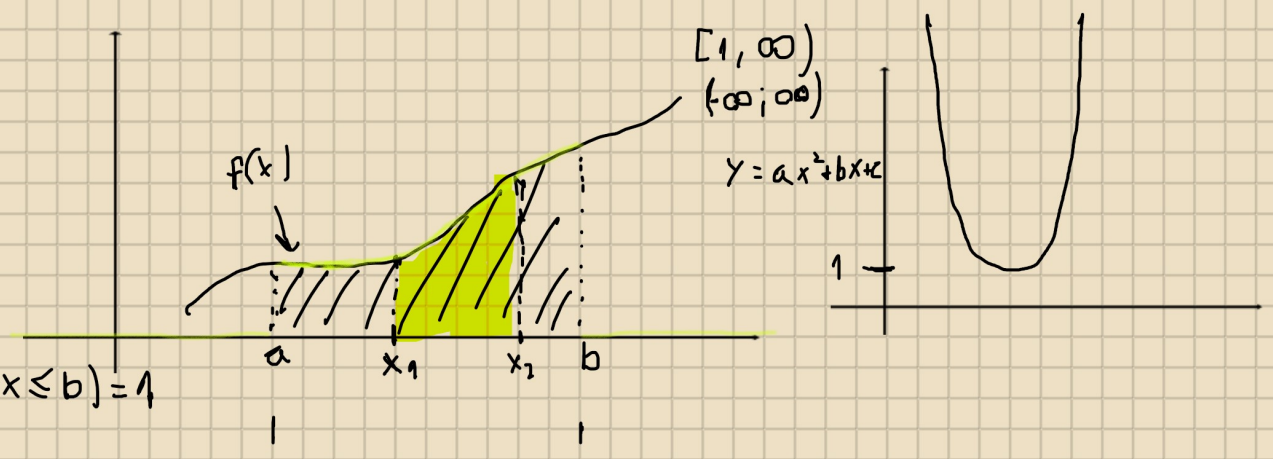
Variables aleatorias continuas

Función de densidad de probabilidad:



CONDICIONES

$f(x) \geq 0 \quad (a \leq x \leq b)$

y

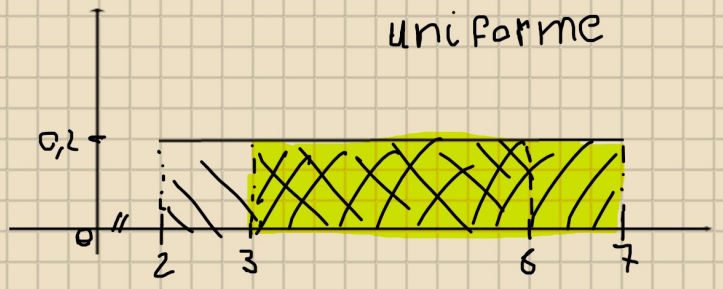
$$P(a \leq x \leq b) = P(a < x < b) = P(a \leq x < b) = P(a < x \leq b) = 1$$

$$f(x) = \begin{cases} f(x) & \text{si } a < x < b \\ 0 & \text{en otro caso} \end{cases}$$

$f(x) = c$

$$f(x) = \begin{cases} 0{,}2 & \text{si } 2 < x < 7 \\ 0 & \text{en otro caso} \end{cases}$$

uniforme



Area $\square = b \cdot h$

$$P(2 < x < 7) = 1 = (7-2) \cdot c = 5 \cdot c = 1 \Rightarrow c = \frac{1}{5} = 0{,}2$$

a) Hallar la constante c (ya lo hicimos).
b) Hallar la probabilidad de que X sea mayor a 4.
c) Hallar la probabilidad de que X sea menor a 6 y mayor a 3.
d) Hallar la probabilidad de que X sea menor a 6 si se sabe que es mayor a 3.

$$P(A \cap B) = P(A/B) \cdot P(B)$$

$$P(A/B) = \frac{P(A \cap B)}{P(B)}$$

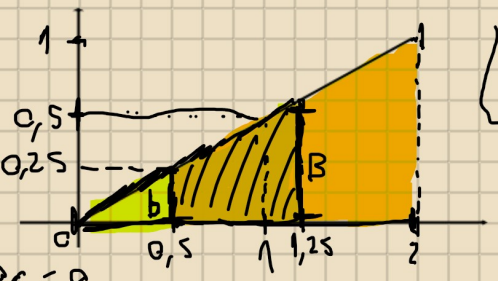
b) $P(X > 4) = (7-4) \cdot 0{,}2 = 3 \cdot 0{,}2 = 0{,}6$

c) $P(3 < X < 6) = (6-3) \cdot 0{,}2 = 3 \cdot 0{,}2 = 0{,}6$

d) $P(X < 6 / X > 3) = \frac{P(3 < X < 6)}{P(X > 3)} = \frac{0{,}6}{(7-3) \cdot 0{,}2} = \frac{0{,}6}{4 \cdot 0{,}2} = \frac{0{,}6}{0{,}7} = 0{,}7\overline{5}$

$$f(x) = \begin{cases} x/2 & \text{si } 0 < x < k \\ 0 & \text{en otro caso} \end{cases}$$

X	Y
0	0
0,5	0,25
1	0,5
1,25	1,25/2



$f(1) = 1/2$ $f(0) = 0/2 = 0$

$f(k) = k/2$

$\text{area}_{\triangle} = \frac{b \cdot h}{2}$

$f(x) = \frac{1}{2} x$

$f(0,5) = \frac{1}{2} \cdot 0,5 = 0,25$

$\text{area}_{\square} = \frac{(B+b) \cdot h}{2}$

a) Hallar el valor de k
b) La probabilidad de que x sea mayor a 1.
c) La probabilidad de que x esté entre 0.5 y 1.25

a) $P(0<x<k) = 1 = \frac{(k-0) \cdot k/2}{2} = \frac{k \cdot k/2}{2} = \frac{k^2}{2} \cdot \frac{1}{2} = \frac{k^2}{4}$

$\left((k-0) \cdot \frac{k}{2}\right) \cdot \frac{1}{2} = \left(\frac{k}{1} \cdot \frac{k}{2}\right) \cdot \frac{1}{2} = \frac{k^2}{2} \cdot \frac{1}{2} = \frac{k^2}{4} \Rightarrow \frac{k^2}{4} = 1 \Rightarrow k^2 = 1 \cdot 4 \Rightarrow k = \sqrt{4} = 2$

b) $P(x>1) = 1 - P(x \leq 1) = 1 - \left(\frac{(1-0) \cdot 1/2}{2}\right) = 1 - \frac{1 \cdot 0,5}{2} = 1 - 0,25 = 0,75$

$P(x>1) = \frac{(1+0,5) \cdot (2-1)}{2} = \frac{1,5 \cdot 1}{2} = 0,75$

c) $P(0,5<x<1,25) = P(x<1,25) - P(x<0,5) = \frac{(1,25-0) \cdot 1,25/2}{2} - \frac{(0,5-0) \cdot 0,5/2}{2} = \frac{1,25 \cdot 0,625}{2} - \frac{0,5 \cdot 0,25}{2} =$

$= 0,39906 - 0,0625 = 0,33281$

$P(0,5<x<1,25) = \frac{\left(\frac{1,25}{2} + \frac{0,5}{2}\right) \cdot (1,25-0,5)}{2} = \frac{(0,625+0,25) \cdot 0,75}{2} = \frac{0,875 \cdot 0,75}{2} = 0,328125$