1:

$$X \sim P_o(\lambda = 3.2)$$

$$F(1) = ppois(1, 3.2) = 0.171$$

$$F(0.99) = " \quad " = 0.0407$$

$$F(3.2) = 0.6025197$$

$$F(-9.5) = 0$$

2:

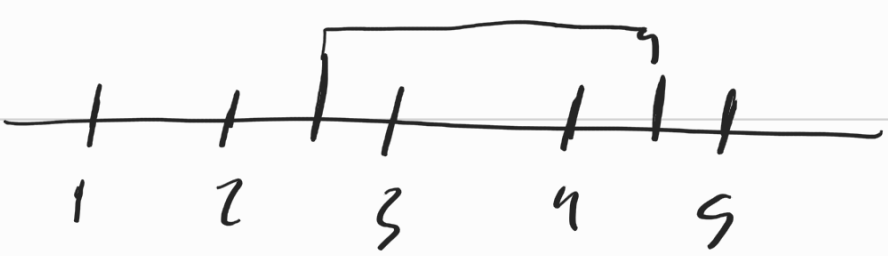
en. ejercicios_lens2.R

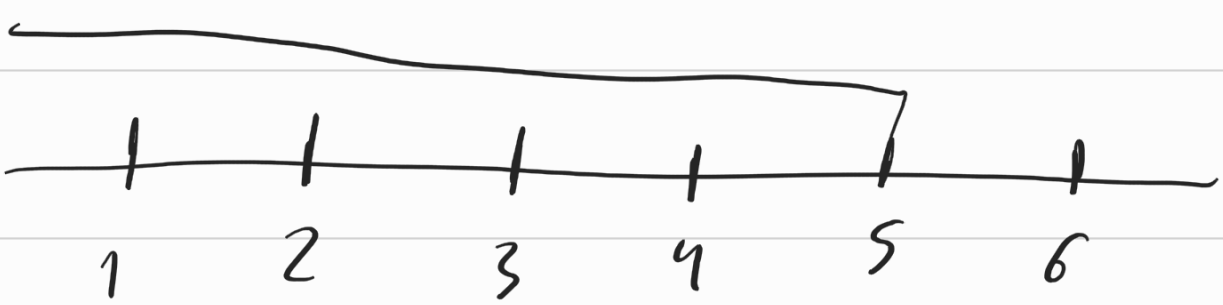
3:

en. ejercicios_tema 2. P1

4:

en. ejercicios_tema 2. P1

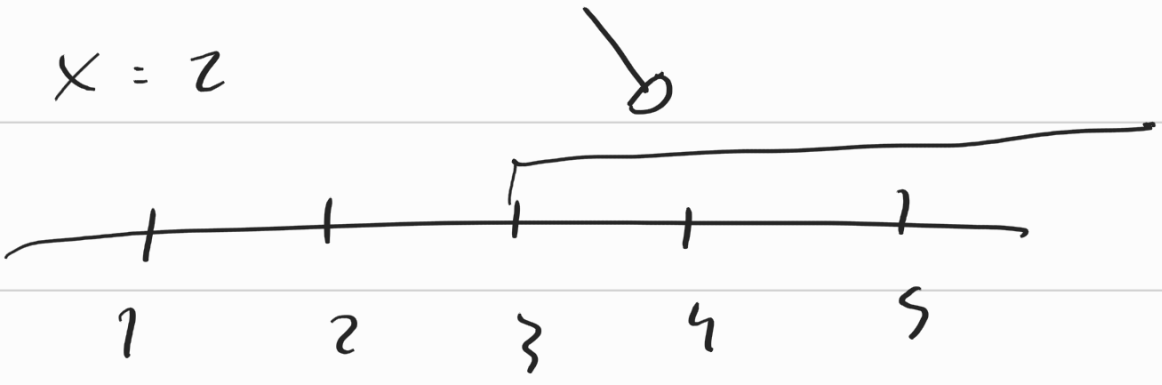




5.

X : variable discreta

$$P(X > x) = (1/2)^x$$



$$1 - P(X > x) = P(X \leq x) =$$

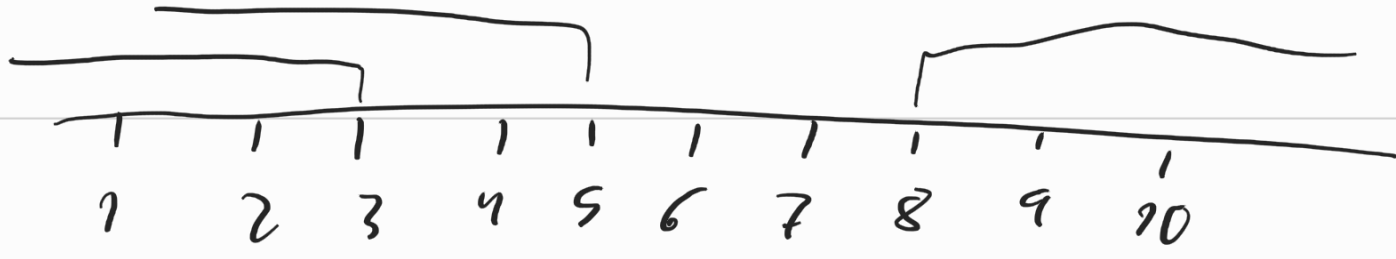
$$1 - (1/2)^x$$

$$F_x(x) = 1 - (1/2)^x$$

$$f_X(x) = F_X'(x) =$$

$$= 1/2^x \cdot \ln(1/2)$$

6.



en. ejercicios - tema 2. R

8.

a) $D \sim P_o(\lambda = 0.005)$

$$P(D < 200 \mid D \geq 150)$$

$$P(D < 200 \mid D \geq 150) =$$

$$\frac{P(D \geq 150 \mid D < 200) \cdot P(D < 200)}{P(D \geq 150)}$$

$$\frac{P(D \geq 150 \cap D < 200)}{P(D \geq 150)}$$

$$P(150 \leq D < 200) =$$

1.

—

9

en . ejercicios - tema 2 . R

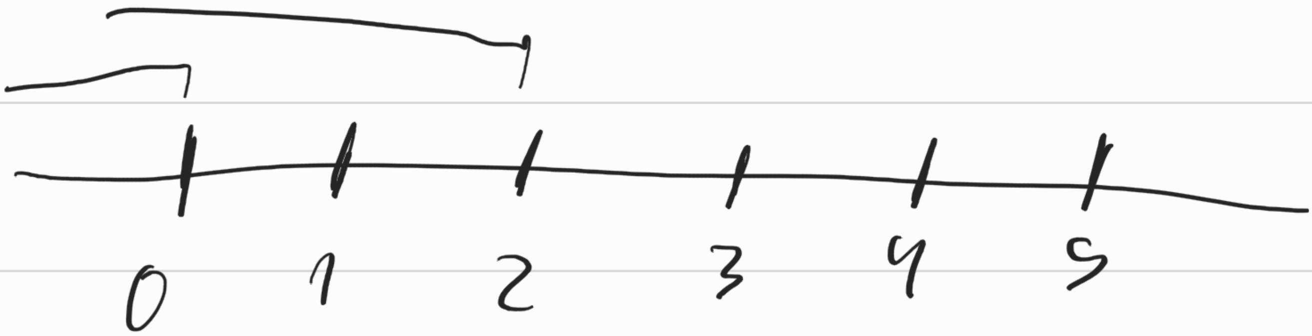
10

en . ejercicios - tema 2 . R

5. Función densidad

$$F_X(t) = P(X \le t) = 1 - \left(\frac{1}{2}\right)^x$$

$$f_X(t) = P(X = t)$$



$$f_X(t) = P(x = t) = P(x \leq t+1)$$

$$- P(x \leq t-1) =$$

$$\left(1 - \left(\frac{1}{2}\right)^{x+1}\right) - \left(1 - \left(\frac{1}{2}\right)^{x-1}\right)$$

$$1 - \left(\frac{1}{2}\right)^{x+1} - 1 + \left(\frac{1}{2}\right)^{x-1}$$

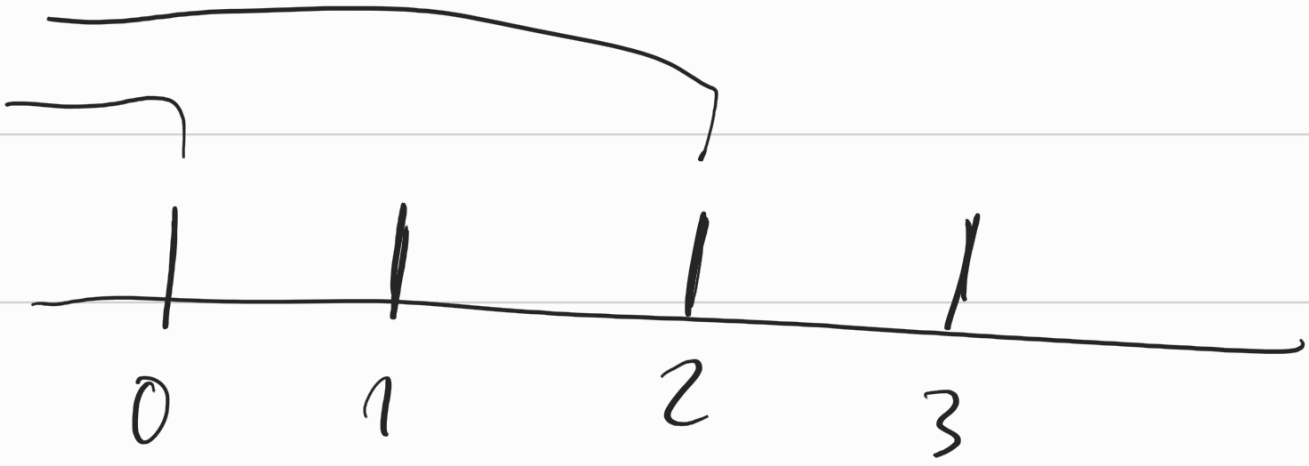
$$- \left(\frac{1}{2}\right)^{x+1} + \left(\frac{1}{2}\right)^{x-1}$$

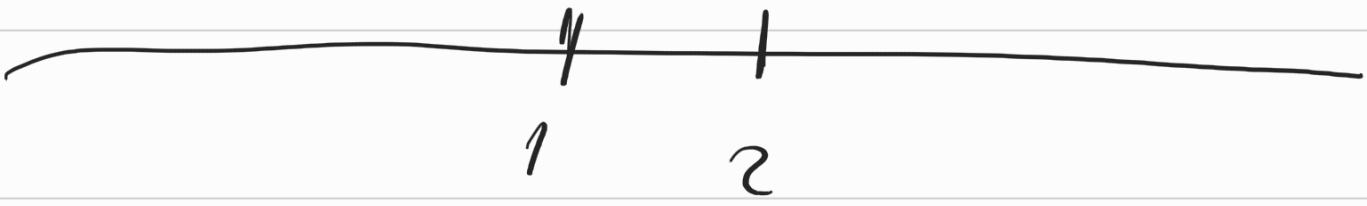
$$\left(\frac{1}{2}\right)^{x-1} - \left(\frac{1}{2}\right)^{x+1} =$$

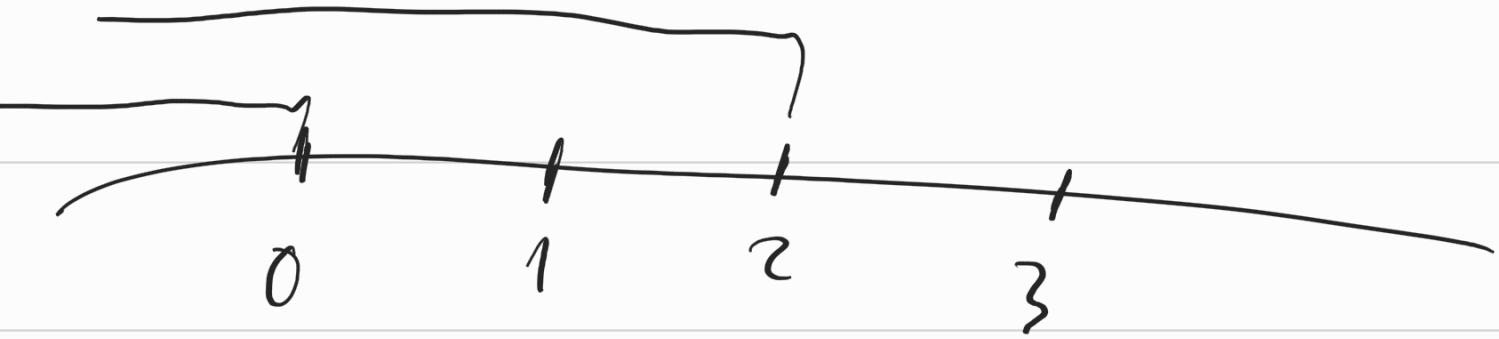
$$\frac{1}{2^{x-1}} - \frac{1}{2^{x+1}} =$$

$$\frac{2^{x+1} - 2^{x-1}}{2^{x-1} \cdot 2^{x+1}} =$$

$$\frac{2^{x+1} - 2^{x-1}}{4^x} =$$


0
1
2
3


1
2


0
1
2
3

$$f_X(t) = P(X = t) =$$

$$P(X \leq t) - P(X \leq t-1)$$

12.

$$Z \sim N(0,1)$$

$$Y = Z^2 \quad d \quad P(Y < 3)?$$

$$P(Y < 3) = P(Z^2 < 3) =$$

$$P(Z < \pm\sqrt{3}) = P(-\sqrt{3} < Z < \sqrt{3})$$

13

en . ejercicios _ tema 2 . P1

14

en . ejercicios _ tema 2 . P1

15

en . ejercicios _ tema 2 . P1

16

en . ejercicios _ tema 2 . P1

17.

X :	0,	1,	2
$p(x)$:	0.3	0.5	0.2

Y :	0,	1,	2
$p(y)$:	0.6	0.1	0.3

} Fonctions de probabilité $f_{X}(x)$

Y \ X	0,	1,	2
0	0.18	0.3	0.12
1	0.03	0.05	0.02
2	0.09	0.15	0.06

Y \ X	0	1	2	
0	0.18	0.3	0.12	0.6
1	0.03	0.05	0.02	0.1
2	0.09	0.15	0.06	0.3
	0.3	0.5	0.2	

b) $P(X=Y) = P(X=0, Y=0) +$

$P(X=1, Y=1) + P(X=2, Y=2) =$

$0.18 + 0.05 + 0.06 = 0.29$

$$P(x \neq y) = 1 - P(x = y)$$

$$= 0.71$$

c)

y \ x	0	1	2	
0	0.18	0.3	0.12	0.6
1	0.03	0.05	0.02	0.1
2	0.09	0.15	0.06	0.3
	0.3	0.5	0.2	

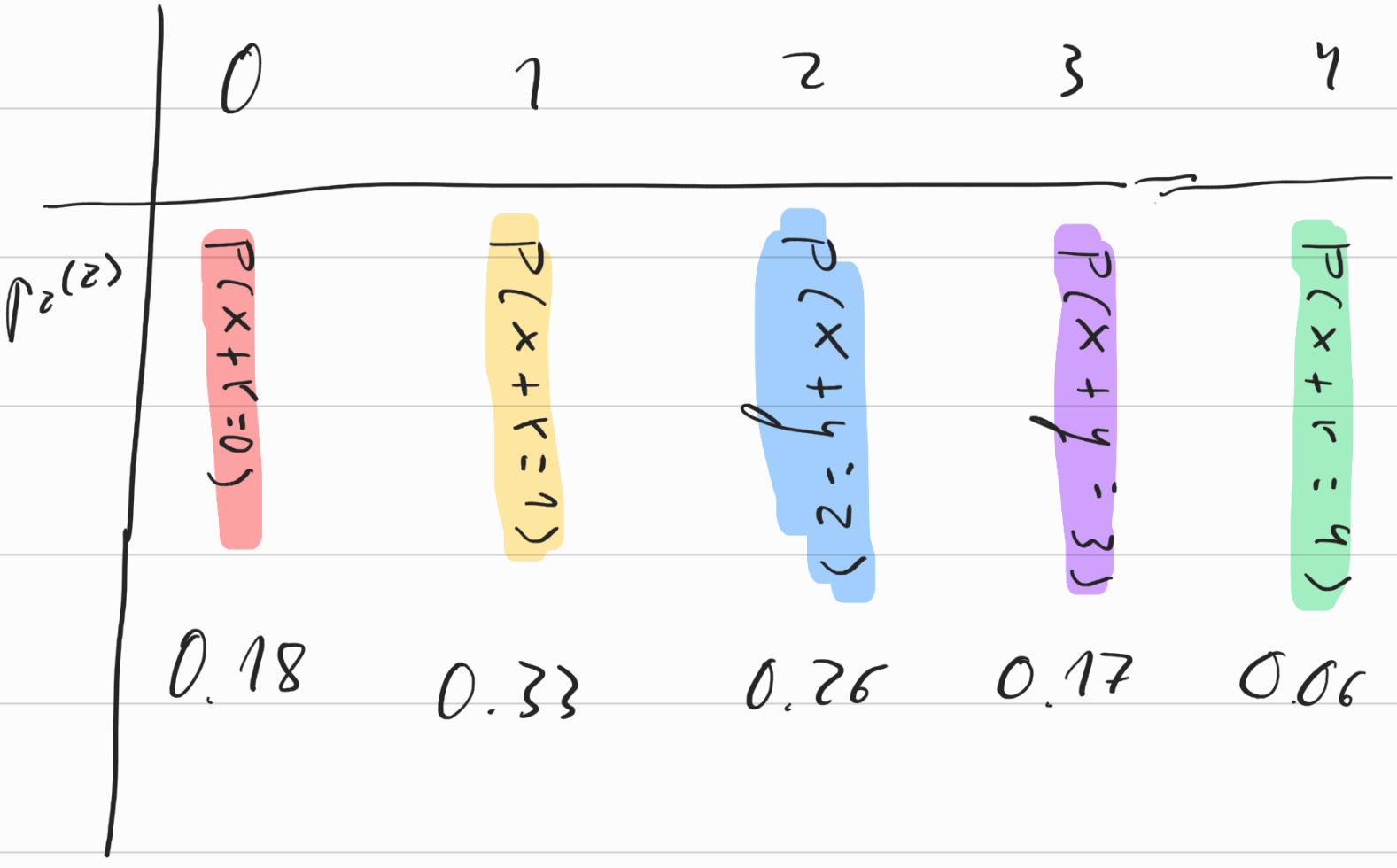
$$P(x \mid y = 2) = P(x = 0, y = 2) +$$

$$P(x = 2, y = 0) + P(x = 1, y = 1) =$$

0.26

d)

$$Z = X + Y$$



Y \ X	0	1	2	
0	0.18	0.3	0.12	0.6
1	0.03	0.05	0.02	0.1
2	0.09	0.15	0.06	0.3
	0.3	0.5	0.2	

18-

$X \sim Un(0,1)$ independientes

$X \sim Un(0,1)$ ✓

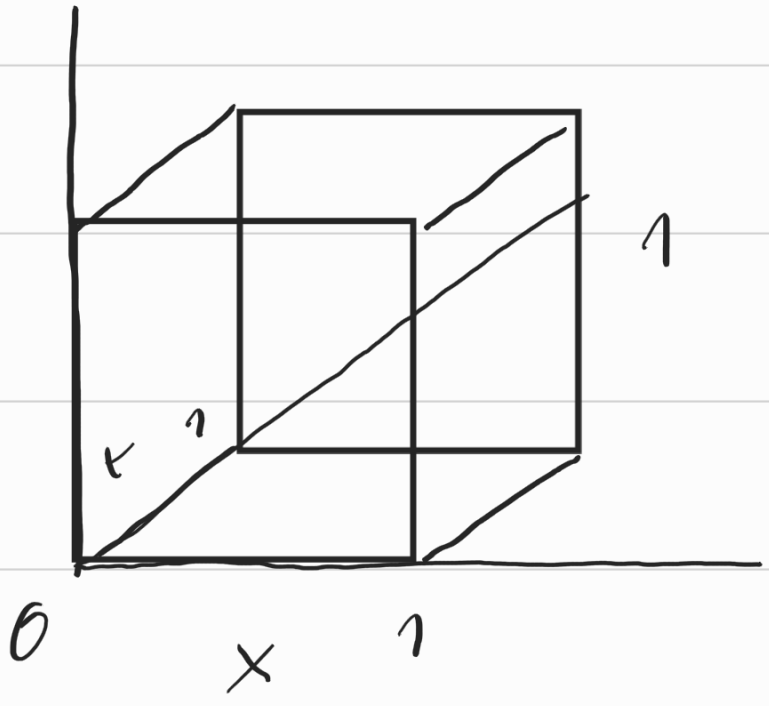
$P(X \cap X) = P(X)\,P(X)$

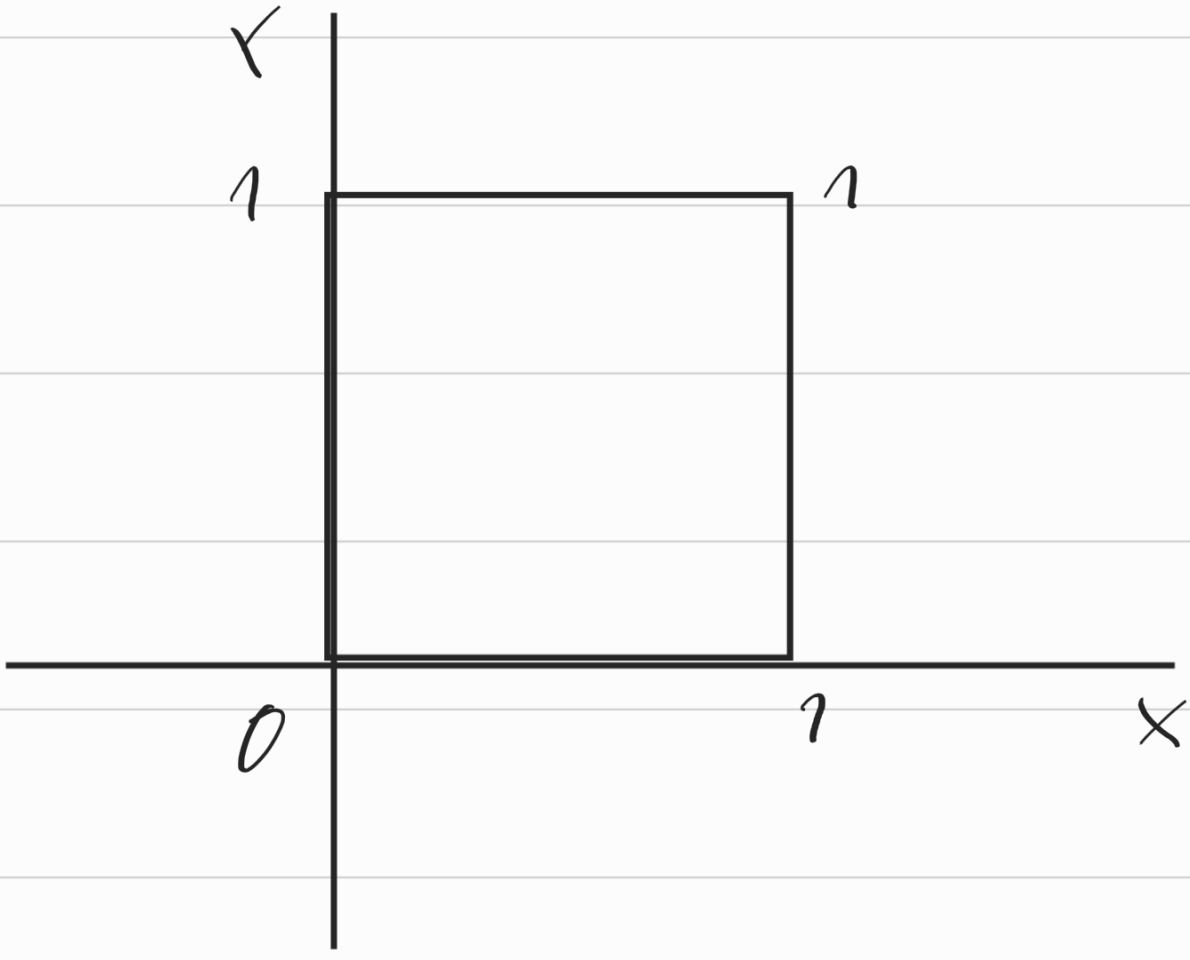
$$P(x|y) = P(x)$$

$$P(y|x) = P(y)$$

a) $P(X=x, Y=y) =$

$$P(x \cap y) = P(X=x) \cdot P(Y=y)$$





b)

Sucesa $2x \leq x$

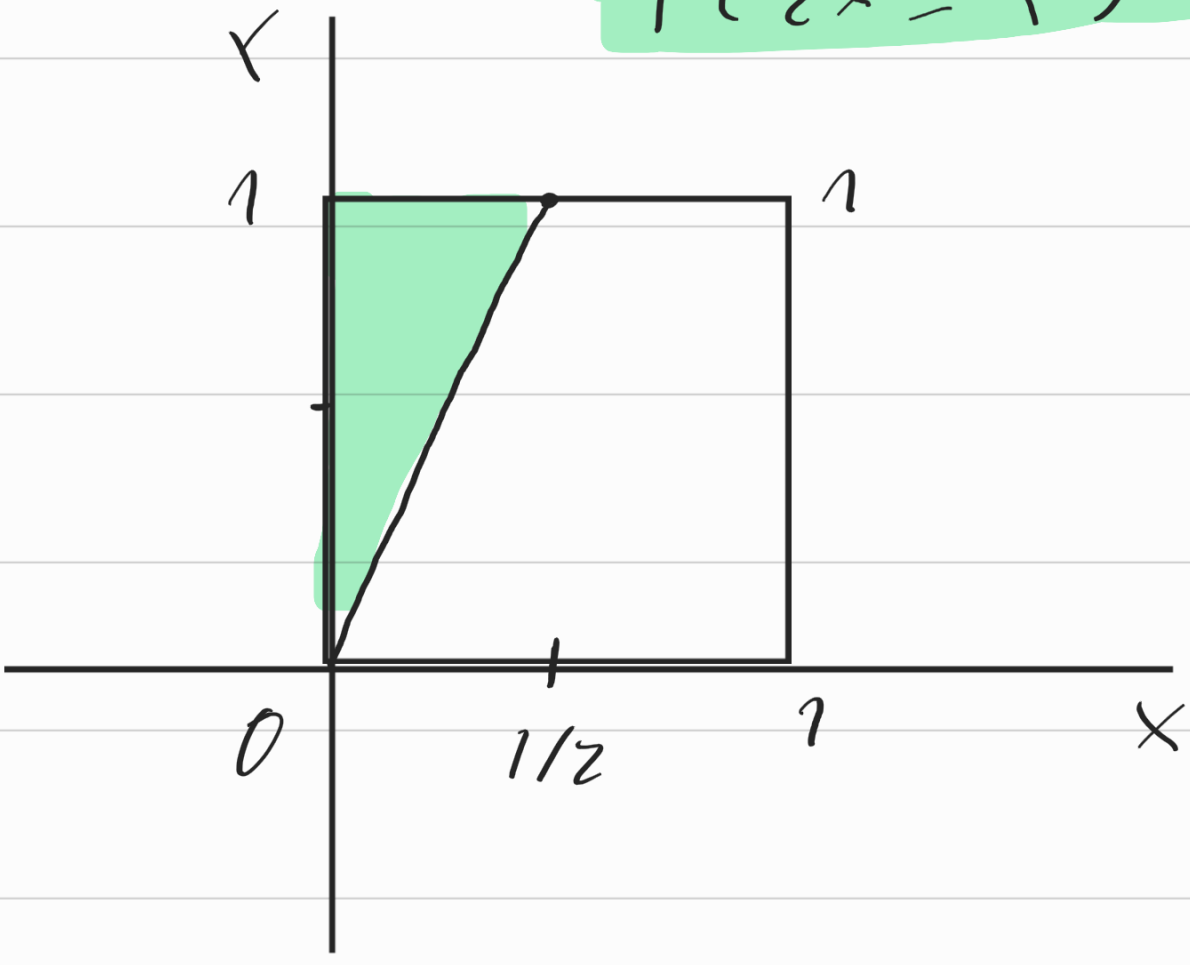
$2x \leq x \simeq$

$2x = x$

x	x
0	0
1	1/2

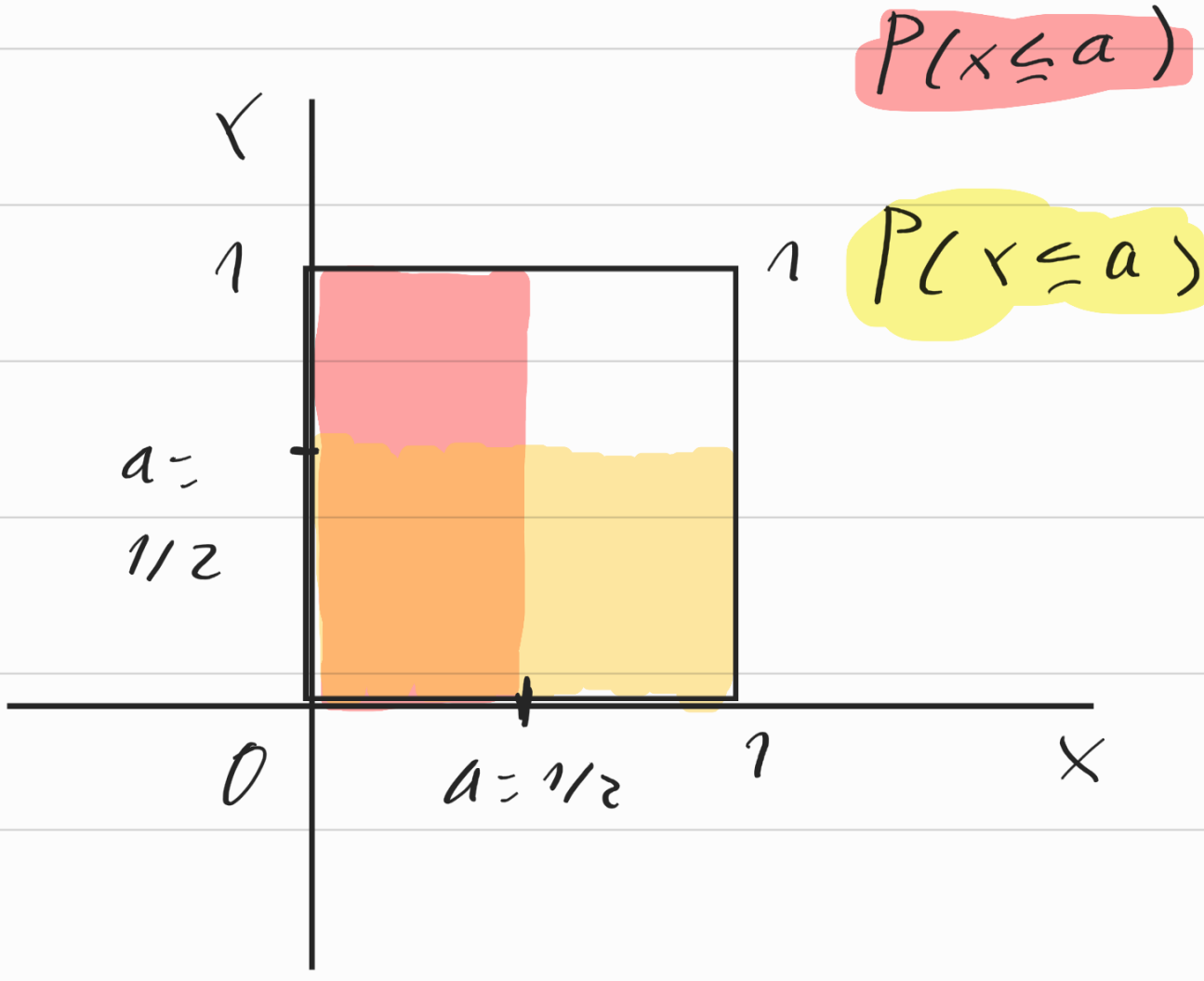
.

$P(2x \leq y)$



$$P(2x \leq y) = \frac{\frac{1}{2} \cdot 1}{2} = \frac{1}{4}$$

c)



$$M = \min(X, Y)$$

$$P(M \leq a) = P(X \leq a \cap Y \leq a) =$$

$$P(X \leq a) \cdot P(Y \leq a) = a \cdot 1 \cdot a \cdot 1$$

$$= a^2 = F_M(a)$$

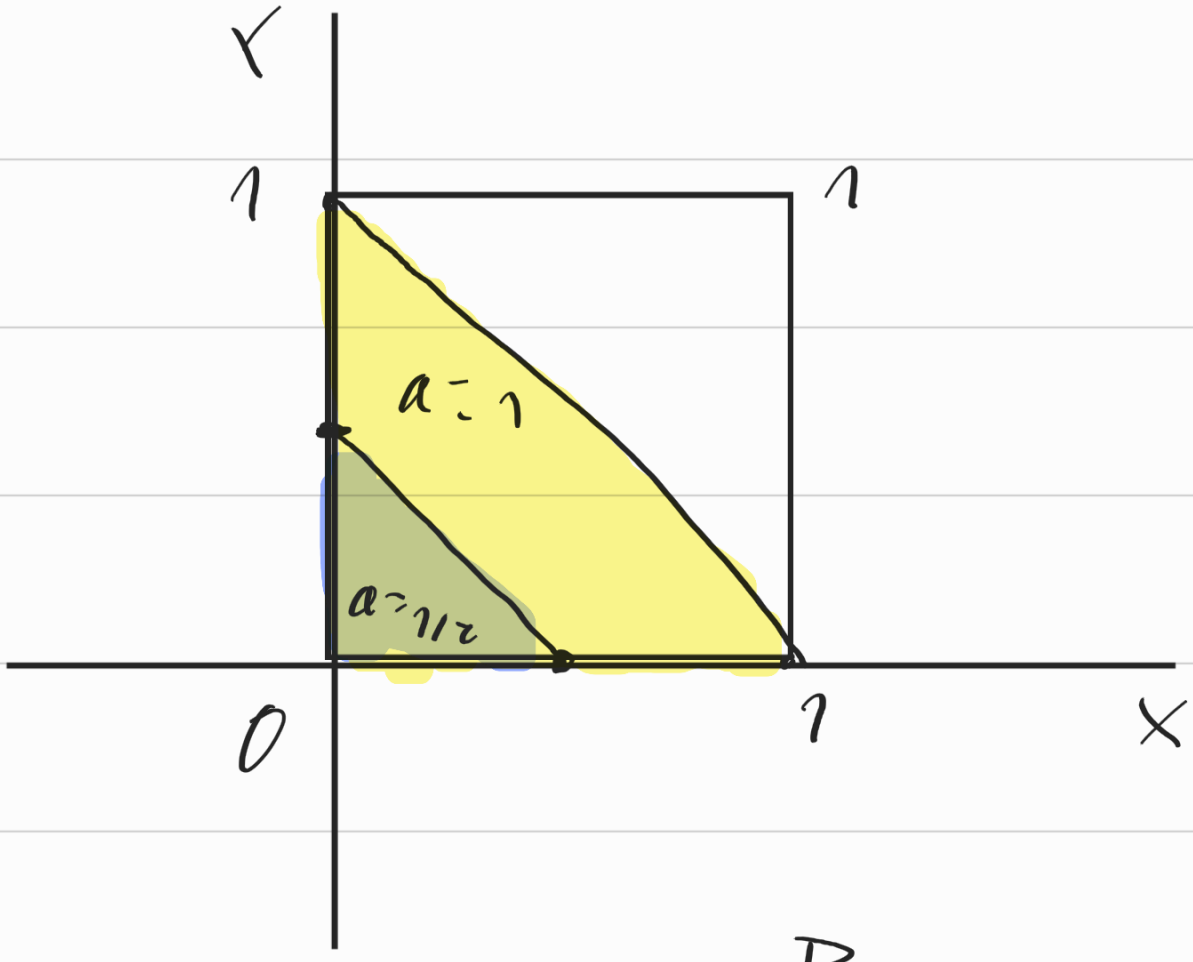
$$f_m(a) = F_m'(a) = 2a$$

d)

$$Z = X + Y$$

$P(Z \leq a)$ ¿ $F_Z(a)$?

¿ $f_Z(a)$?



$$P(X+Y \leq a) = P(Y \leq a - X)$$

$Y = a - X$ $\quad a = 1/2$

X	Y
0	1/2
1/2	0

$a = 1$

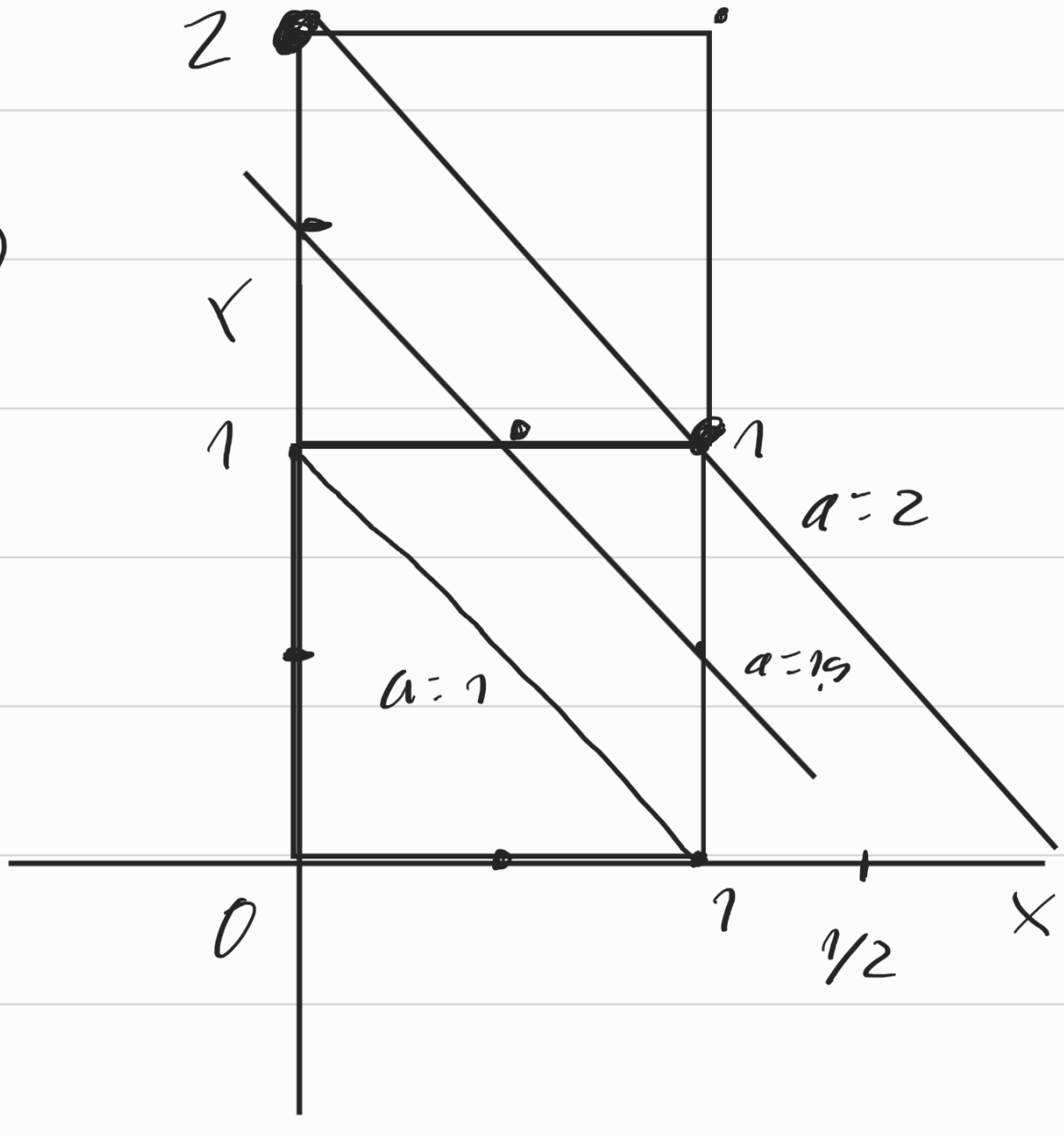
X	Y
0	1
1	0

$$P(X+Y \le a) = P(Z \le a)$$

$$= \frac{a^2}{2} = F_Z(a)$$

$$f_Z(a) = F_Z'(a) = a$$

e)



$P(X+Y \leq a)$

$Y = a - X \qquad a = 2$

X	Y
1	1
0	2

$a = 1$

$a = 1.5$

X	Y
1	0
0	1

X	Y
1	$\frac{1}{2}$
0	1.5

$$F_X(a) = P(X+Y \leq a) = 1 - \frac{(2-a)^2}{2}$$

19.

$N \sim P_o(\lambda = 1,8)$

$N =$ # total hijos

$P(\text{tener un hijo varón}) = 0,51$

$P(\text{tener un hijo mujer}) = 0,49$

$S \sim Bi(n = 2, p = 0.49)$

$$F_{N,S}(n,s) = F_{N,S}(N \le n, S \le s)$$

$$= F_N(N \le n) \cdot F_S(S \le s) =$$

$$P(N=2, S=2) = \int_N (N=2) \cdot \int_S (S=2)$$

$$= 0.0643$$

20.

M: número de semillas producidas por una planta.

$M \sim Bi(n=5, p=0,5)$

R: número de semillas que germinan.

$R \sim Bi(n=M, p=0.8)$

a)

$$f_R(r \mid M=3) = P(r \mid M=3)$$

$$= \frac{P(M=3 \mid r)\, P(r)}{P(m=3)} =$$

$$\frac{P(M=3 \cap r)}{P(m=3)} = \frac{P(m=3) \cdot P(r)}{P(M=3)} =$$

$$= P(r)$$

b) $f_{M,R}(m, r) = P(M=m, R=r)$

$$= P(M=m) \cdot P(R=r) =$$

$$dbinom(m, 5, 0.5) \cdot pbinom(r, 5, 0.8)$$

c)

$$F_R(r) = P(R \leq r)$$

$$R \sim Bi(p = 0.8, n = 5)$$

d) $F_M(m \mid R = 2) =$

$$F_M(M \leq m)$$

26 :

M: número de semillas producidas por una planta.

$M \sim Bi(n=5, p=0,5)$

P: número de semillas que germinan.

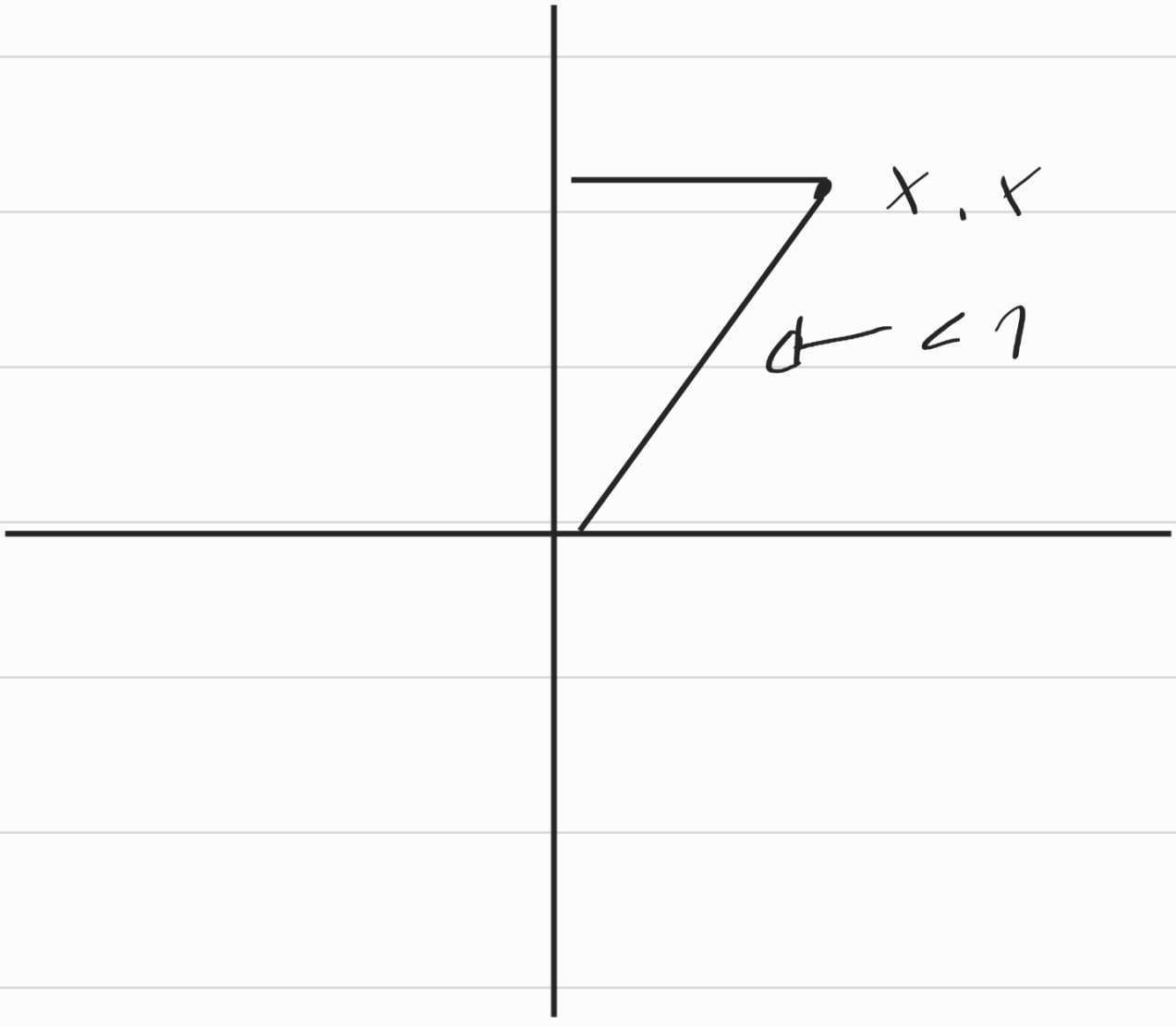
$P \sim Bi(n=M, p=0.8)$

d)

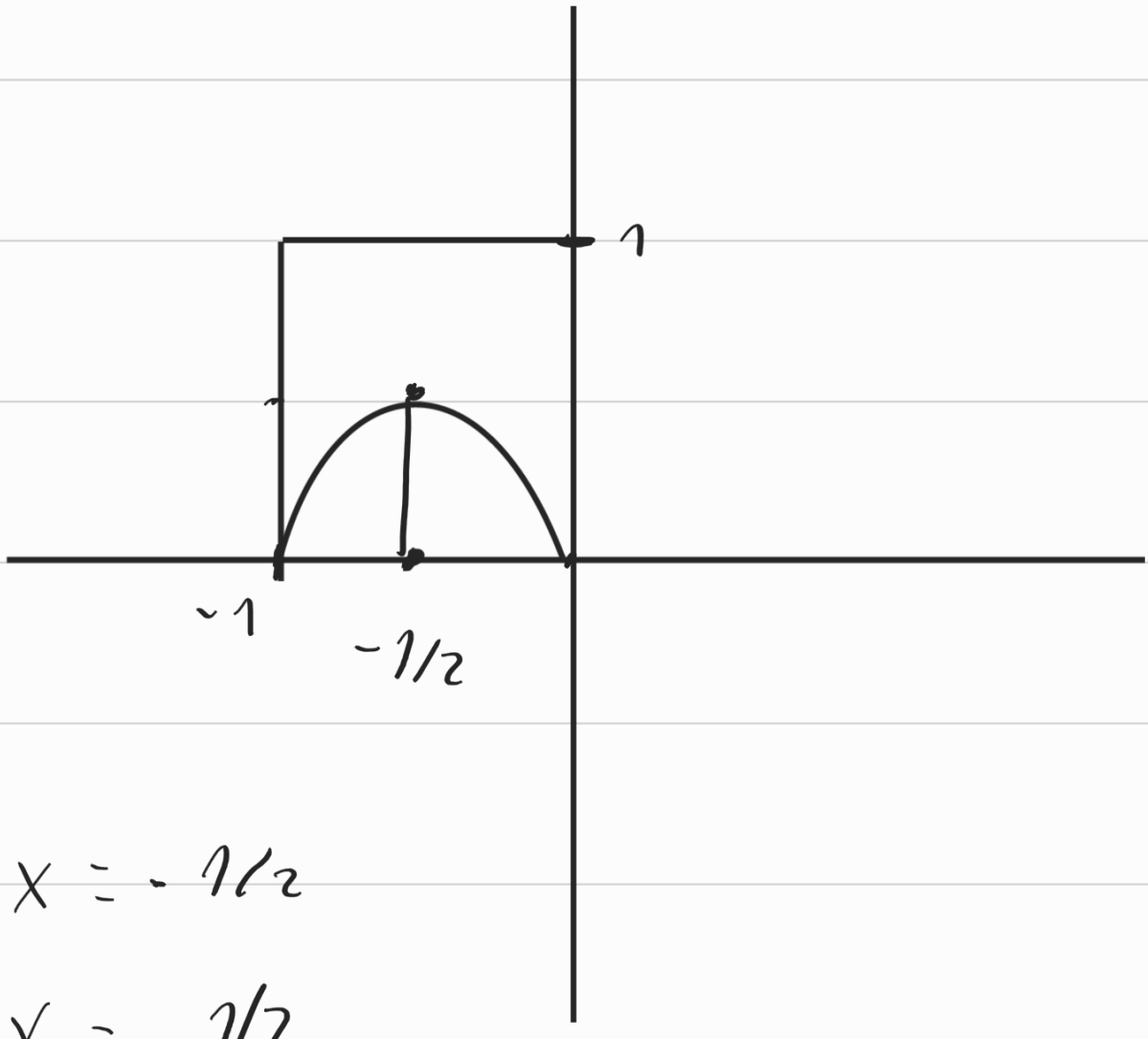
$$F_m(m \mid R=2) =$$

$$\frac{F_{M,R}(m, R=2)}{F_R(R=2)} =$$

21.

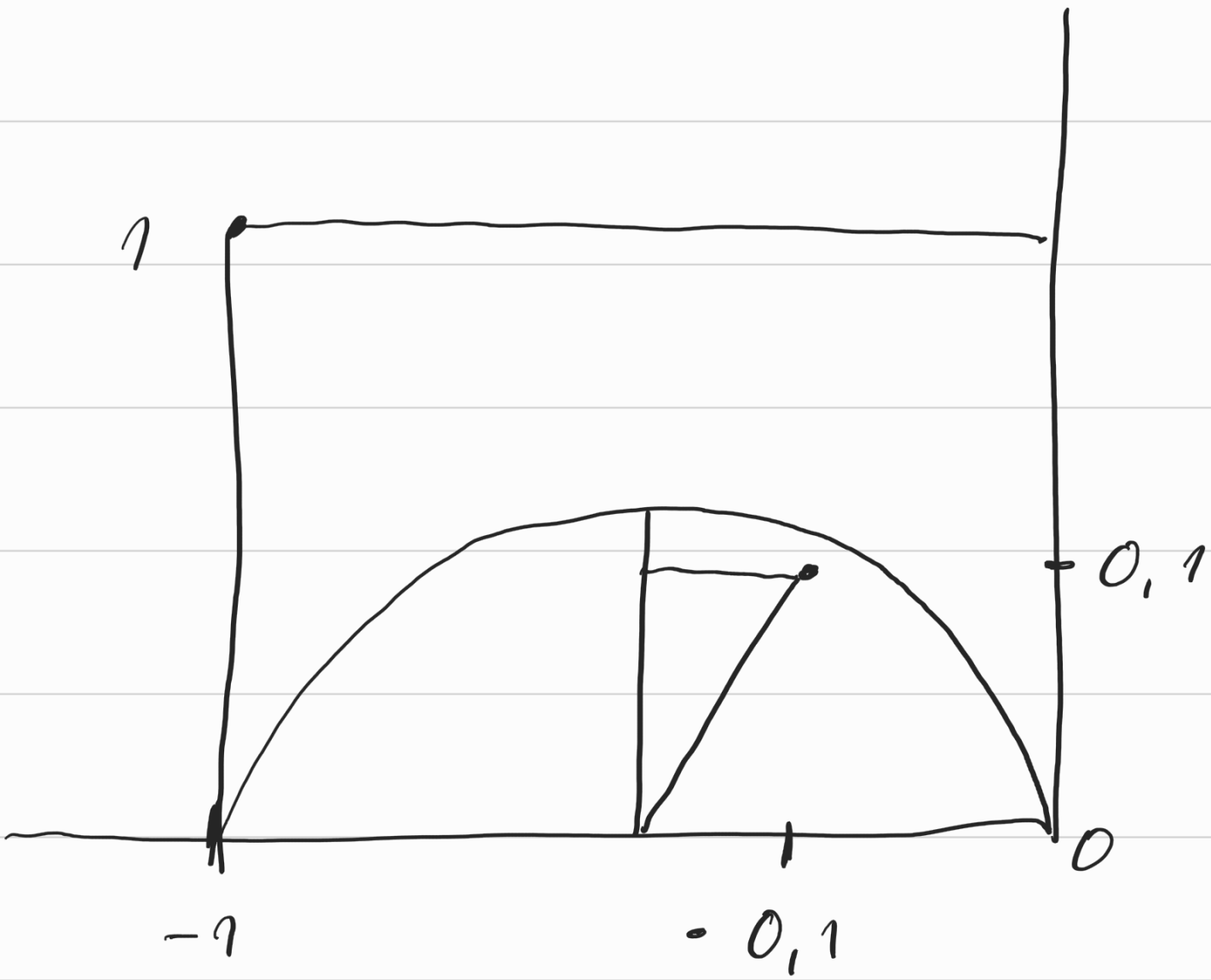


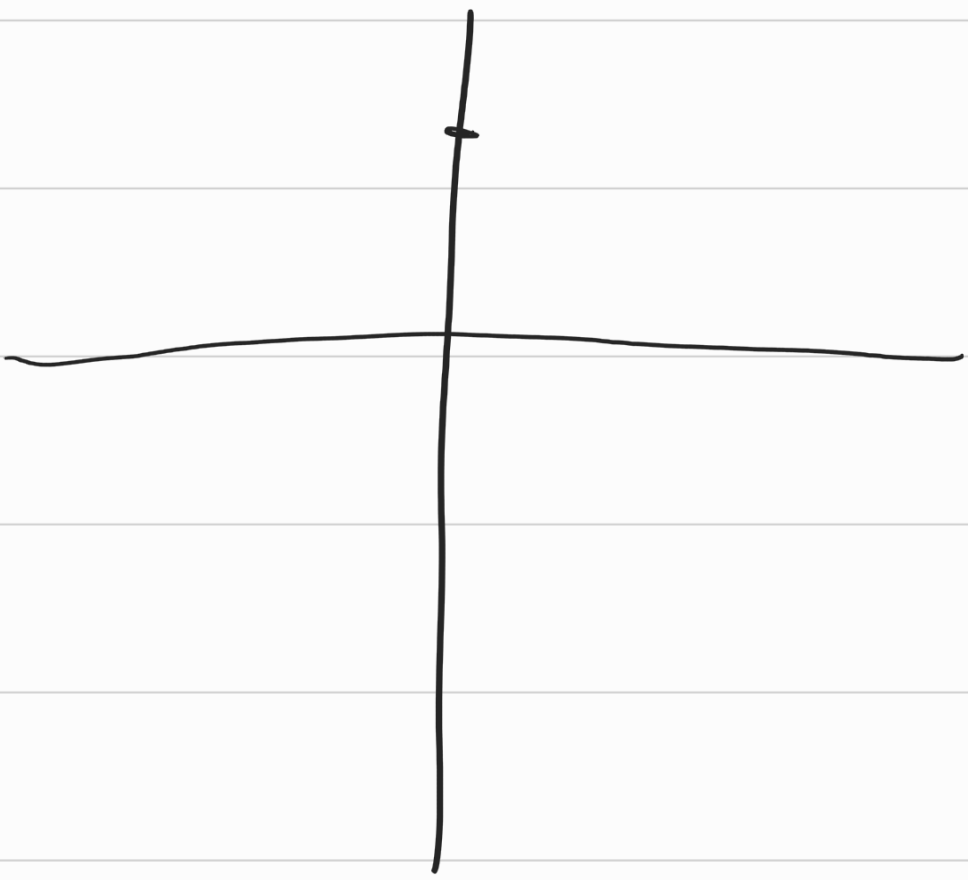
22.



$x = -1/2$

$y = 1/2$


1
0,1
0
-1
-0,1



30.:

	$Y=0$	$Y=1$	$Y=2$	
$X=1$	0.1	0.2	0.1	0.4
$X=2$	0.2	0.3	0.1	0.6
	0.3	0.5	0.2	

$Y \mid X = 1$

$$f_{Y|X=1} = \frac{(Y, X=1)}{f(X=1)} =$$

	Y = 0	Y = 1	Y = 2
	$\frac{0.1}{0.4}$	$\frac{0.2}{0.4}$	$\frac{0.1}{0.4}$ =
	0.25	0.5	0.25

$Y|X=2$ $\quad f_{Y|X=2}(y) = \frac{f(Y, X=2)}{f(X=2)}$

	Y = 0	Y = 1	Y = 2
	$\frac{0.2}{0.6}$	$\frac{0.3}{0.6}$	$\frac{0.1}{0.6}$

$V = |X - Y|$

1	0	2
0.1	0.2	0.2
0.1	0.1	
0.3		
1/2	0.3	0.2

	$Y=0$	$Y=1$	$Y=2$	
$X=1$	0.1	0.2	0.1	0.4
$X=2$	0.2	0.3	0.1	0.6
	0.3	0.5	0.2	

37.

$$F(x,y) = F_X(x) \cdot F_Y(y) \quad \forall (x,y) \in \mathbb{R}^2$$

$$X \sim P_2(\lambda = 3)$$

$$Y \sim P_2(\lambda = 4)$$

$$P(X+Y=2) = P(X=0, Y=2) +$$

$$P(X=1, Y=1) + P(X=2, Y=0) =$$

$$f(X=0, Y=2) + f(X=0, Y=2) + f(X=2, Y=0)$$

$$= f(X=0) \cdot f(Y=2) + f(X=1) f(Y=1) +$$

$$f(X=2) \cdot f(Y=0) = 0.037837$$

3 2

$$f(x,y) = \lambda^2 e^{-\lambda(x+y)} \quad si \quad x>0,\ y>0$$

$$f(x,y) = f_x(x) \cdot f_x(y)$$

$$f_x(x) = \lambda e^{-\lambda x}$$

$$f_x(y) = \lambda e^{-\lambda y}$$

a) $U = \max(x,y)$

$$F_U(a) = P(U \leq a) = F_x(x \leq a).$$

$$F_y(y \leq a)$$

$$f_U(a) = F_U'(a) - F_X'(x \le a).$$

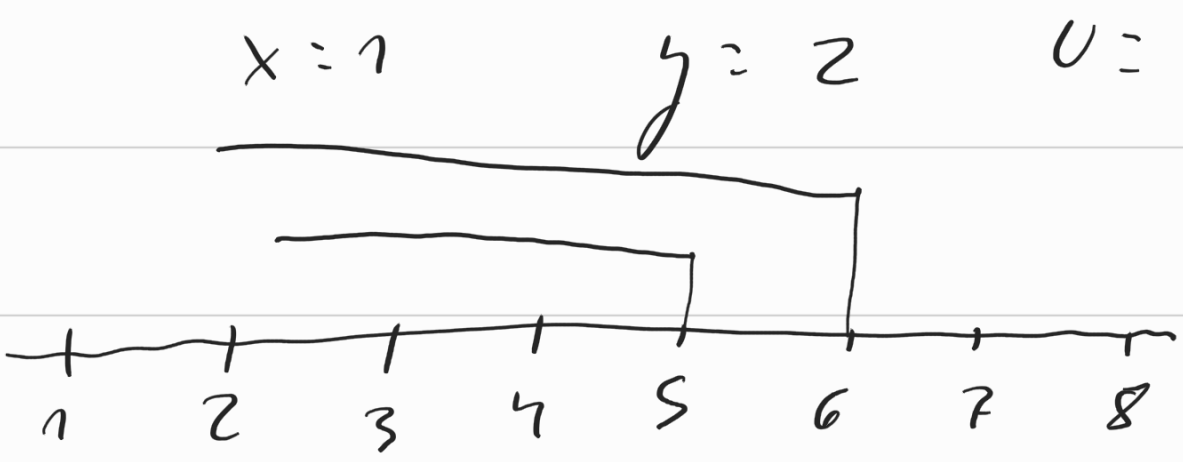
$$F_Y(y \le a) + F_X'(y \le a) \cdot F_>(x \le a)$$

a)

$$V = \min(X, Y)$$

X	Y	$\tilde{n}$	M
		$\tilde{z}$	z
0	3	0	3
1	1	1	1
2	2	2	2
3	0	0	3

$$V = \max(X, Y)$$



$$F_X(6) = P(X \leq 6)$$

$$V = \min(X, Y) \quad \dot{c} \; F_V(a) ?$$

$$P(V \leq a)$$

$$P(V \geq a) = P(X > a) \cdot P(Y > a$$

$$P(V \geq a) = (1 - P(x \leq a)) \cdot (1 - P(y \leq a))$$

$$F_V(a) =$$

$$P(V \leq a) = 1 - P(V \geq a)$$

$$1 - \left((1 - P(x \leq a)) \cdot (1 - P(y \leq a)) \right)$$

$$\circ \quad f_V(a) = F'_V(a) =$$

$$- \left(- f_x(a) \cdot (1 - P(y \leq a)) - \right.$$

$$\left. f_y(a) \cdot (1 - P(x \leq a)) \right)$$

33: