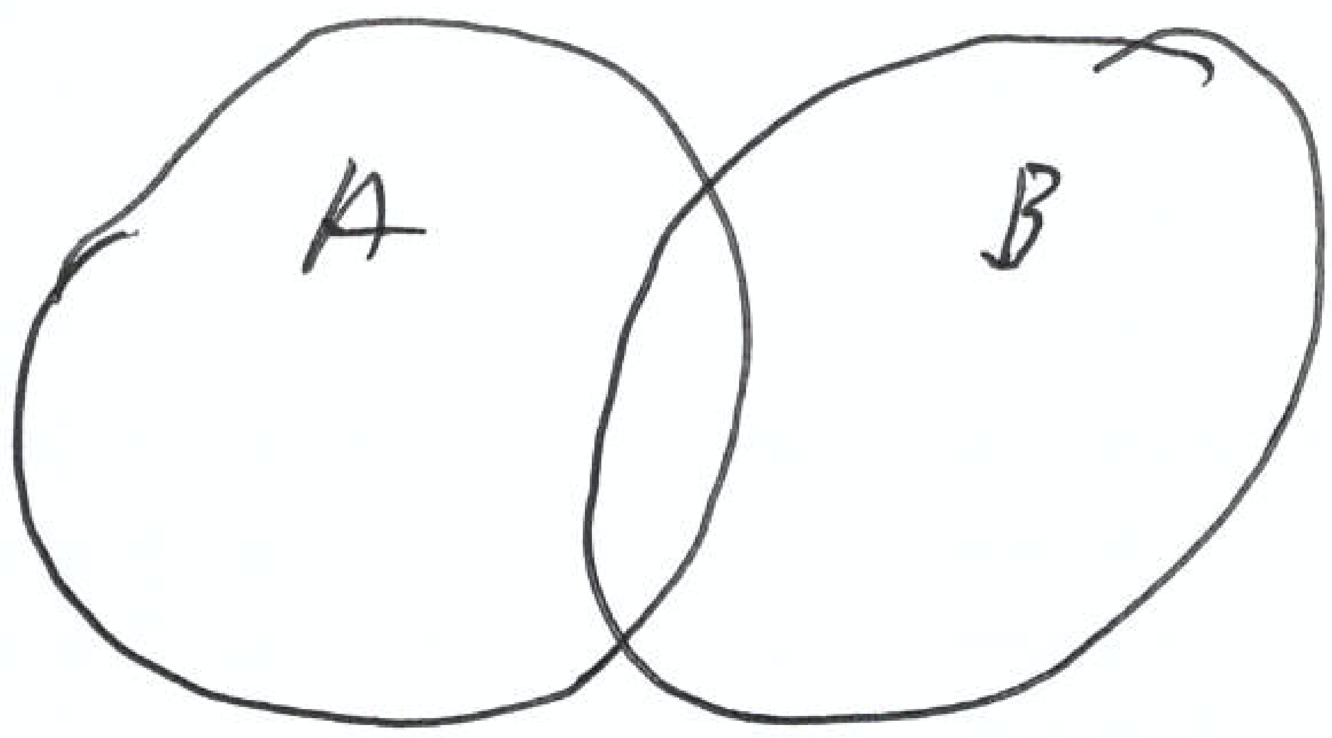
$A \subseteq B$

$B = (A \cap B) \cup (\bar{A} \cap B) = A \cup (\bar{A} \cap B)$

$P(B) = P(A) + P(\bar{A} \cap B) \qquad P(B) \geq P(A)$



$$A \cup B = \underbrace{(A \cap \bar{B}) \cup (A \cap B)}_{A} \cup \underbrace{(\bar{A} \cap B)}_{B}$$

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$\Omega = A \cup \bar{A}$

$P(\Omega) = P(A) + P(\bar{A}) = 1$

$P(\bar{A}) = 1 - P(A)$

$\Omega = \{e_1, e_2, e_3\}$

$\mathcal{P}(\Omega)$ insieme delle parti

INSIEMI	PROB.
$\emptyset$	0
$\{e_1\}$	$1/3$
$\{e_2\}$	$1/3$
$\{e_3\}$	$1/3$
$\{e_1, e_2\} = \{e_1\} \cup \{e_2\}$	$2/3$
$\{e_1, e_3\} = \{e_1\} \cup \{e_3\}$	$2/3$
$\{e_2, e_3\} = \{e_2\} \cup \{e_3\}$	$2/3$
$\Omega = \{e_1, e_2, e_3\} = \{e_1\} \cup \{e_2\} \cup \{e_3\}$	1

CON RIP ORDINATI

$$\underbrace{N \times N \times \cdots N}_{n \text{ volte}} = N^n$$

SENZA RIP ORDINATI

$$\underbrace{N \cdot (N-1) \cdot (N-2) \cdot \ldots (N-n+1)}_{n \text{ fattori}} = (N)_n = \frac{N!}{(N-n)!}$$

SENZA RIP NON ORDINATI

$$\frac{(N)_n}{n!} = \frac{(N)_n (N-n)!}{n!(N-n)!} = \frac{N!}{n!(N-n)!} =$$

$$= \binom{N}{n} = \binom{N}{N-n}$$

NON ORDINATI CON RIPOSIZIONE

esempi

a 3

b 2

c 4

d 1

$N = 4$

$n = 10$

$\overset{a}{xxx} \,|\, \overset{b}{xx} \,|\, \overset{c}{xxxx} \,|\, \overset{d}{x}$

$N-1$ barre

n asterischi

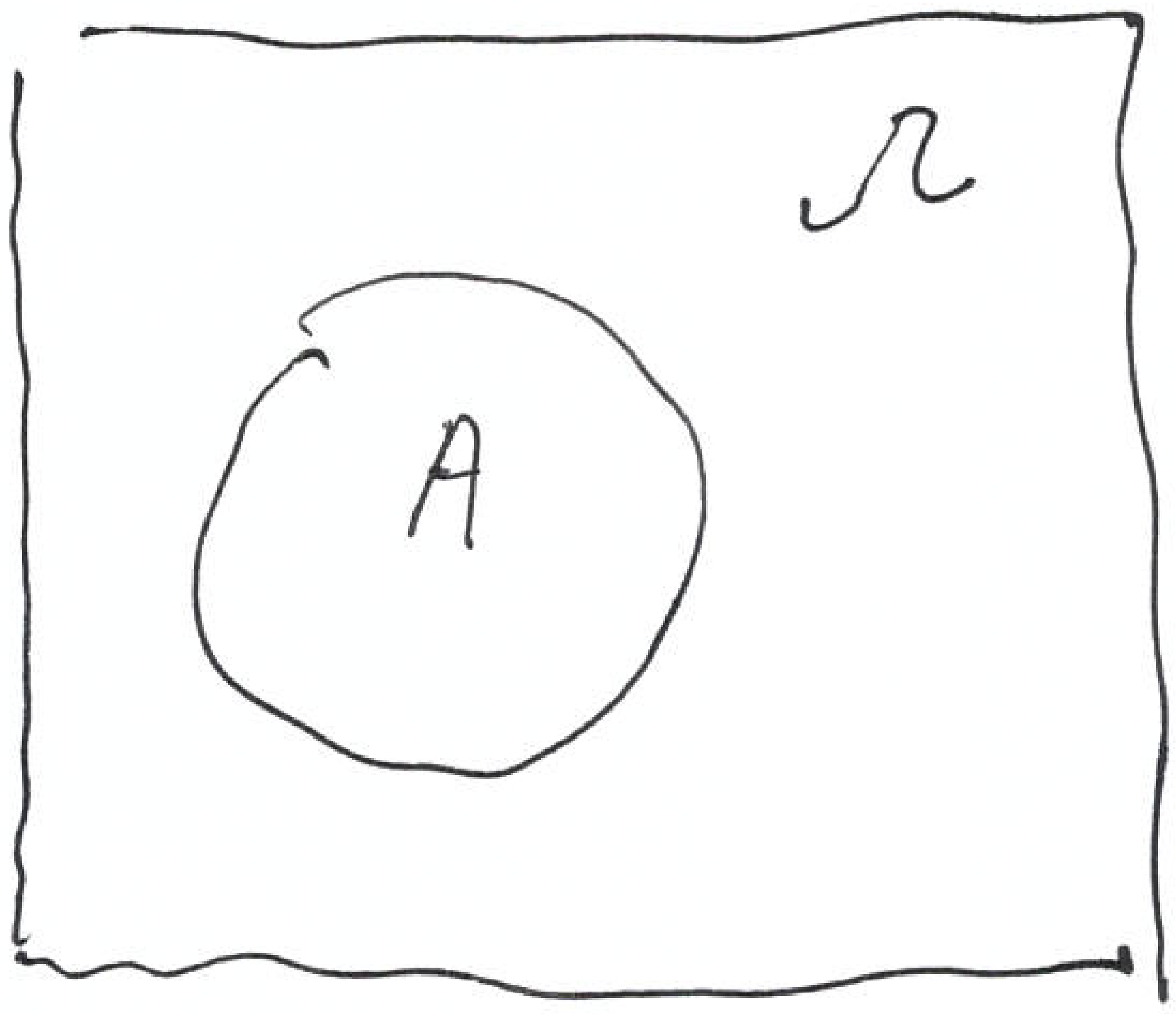
$N-1+n$ posizioni

$$\binom{N-1+n}{n} = \binom{N-1+n}{N-1}$$

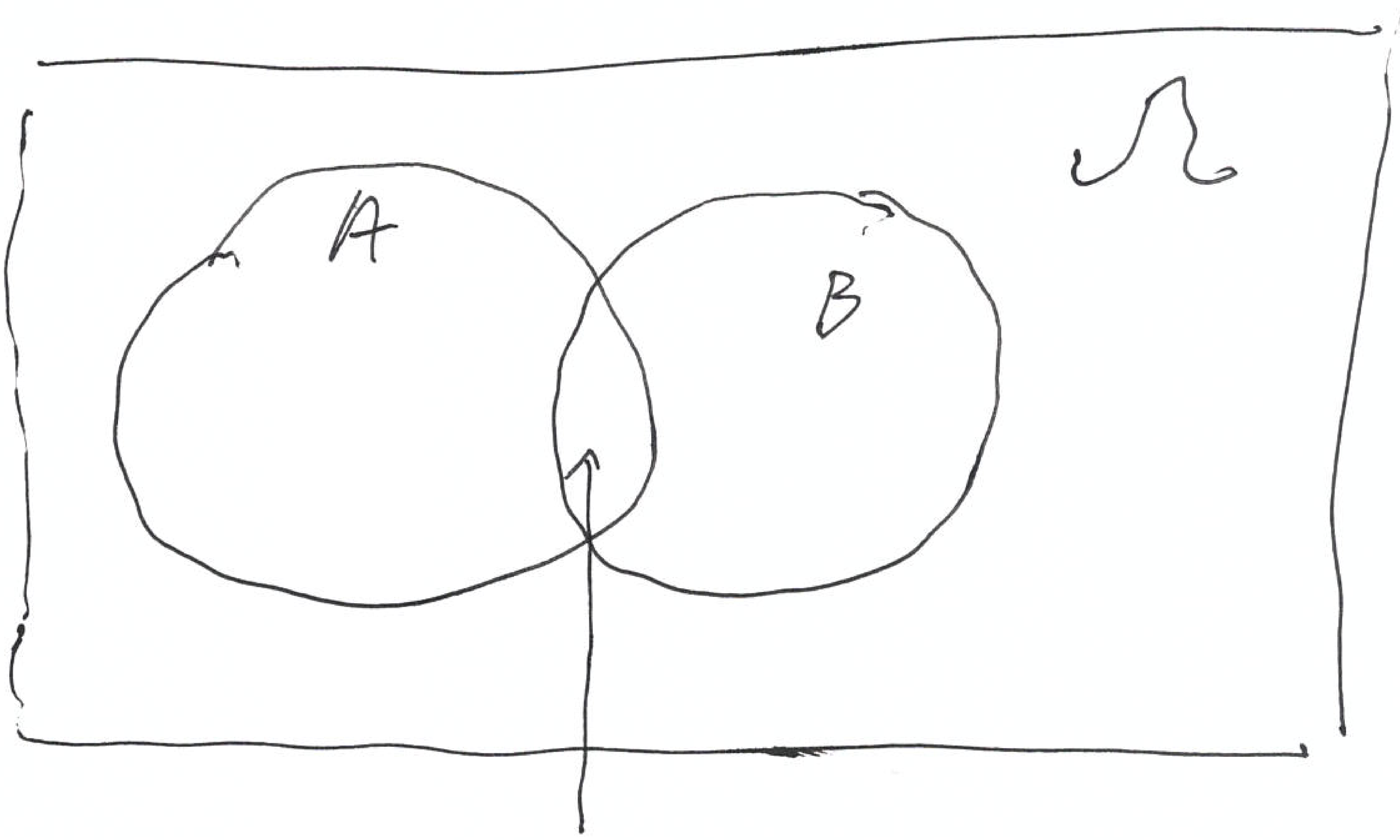
modi di scegliere posizioni per *

modo di scegliere posizioni per /

PROB. CONDIZ



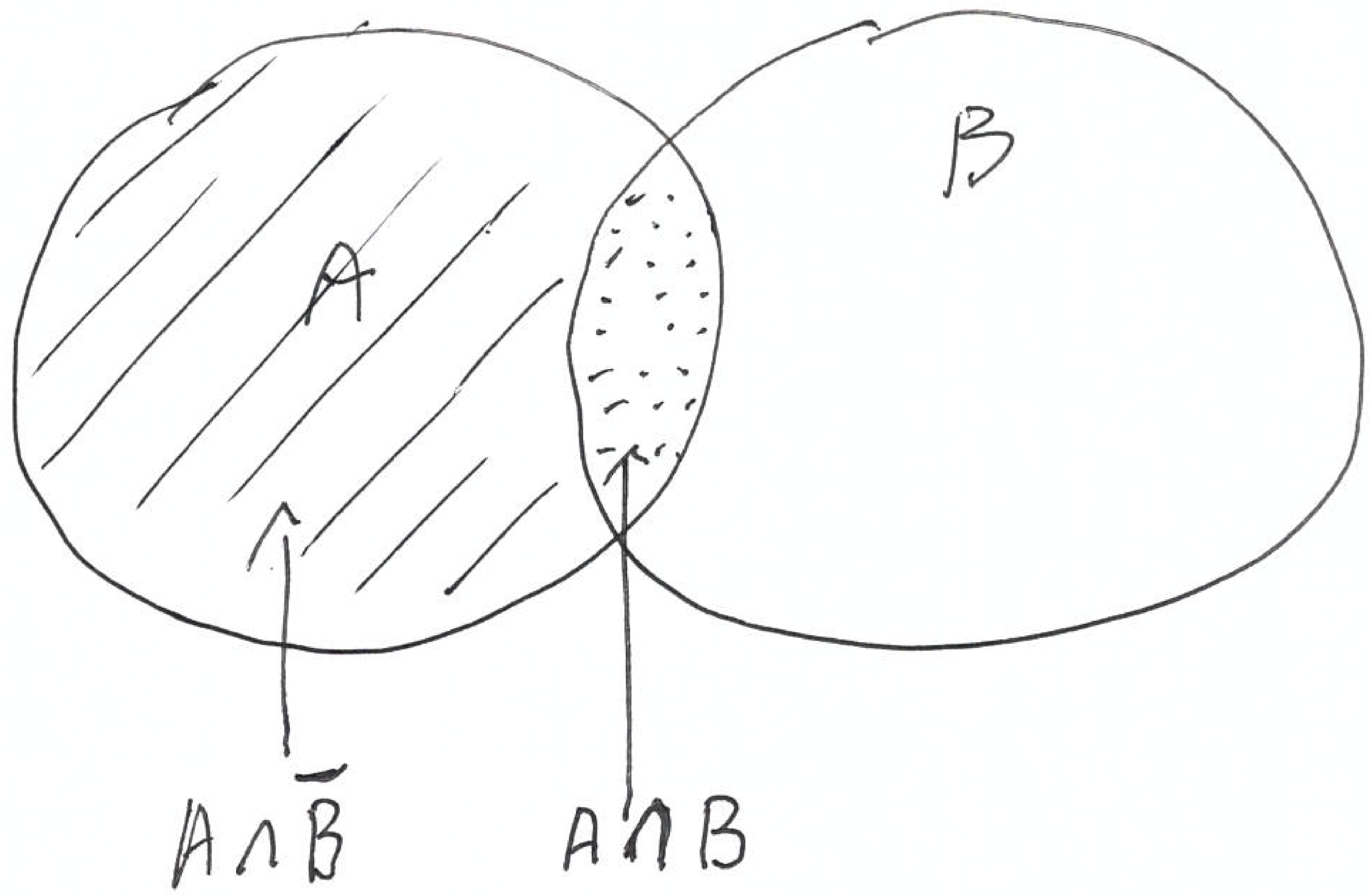
$$P(A) = \frac{K_A}{K}$$



$A \wedge B$

$$P(A|B) = \frac{\dfrac{K_{A \wedge B}}{K}}{\dfrac{K_B}{K}} = \frac{K_{A \wedge B}}{K_B}$$

PROBABILITA TOTALE



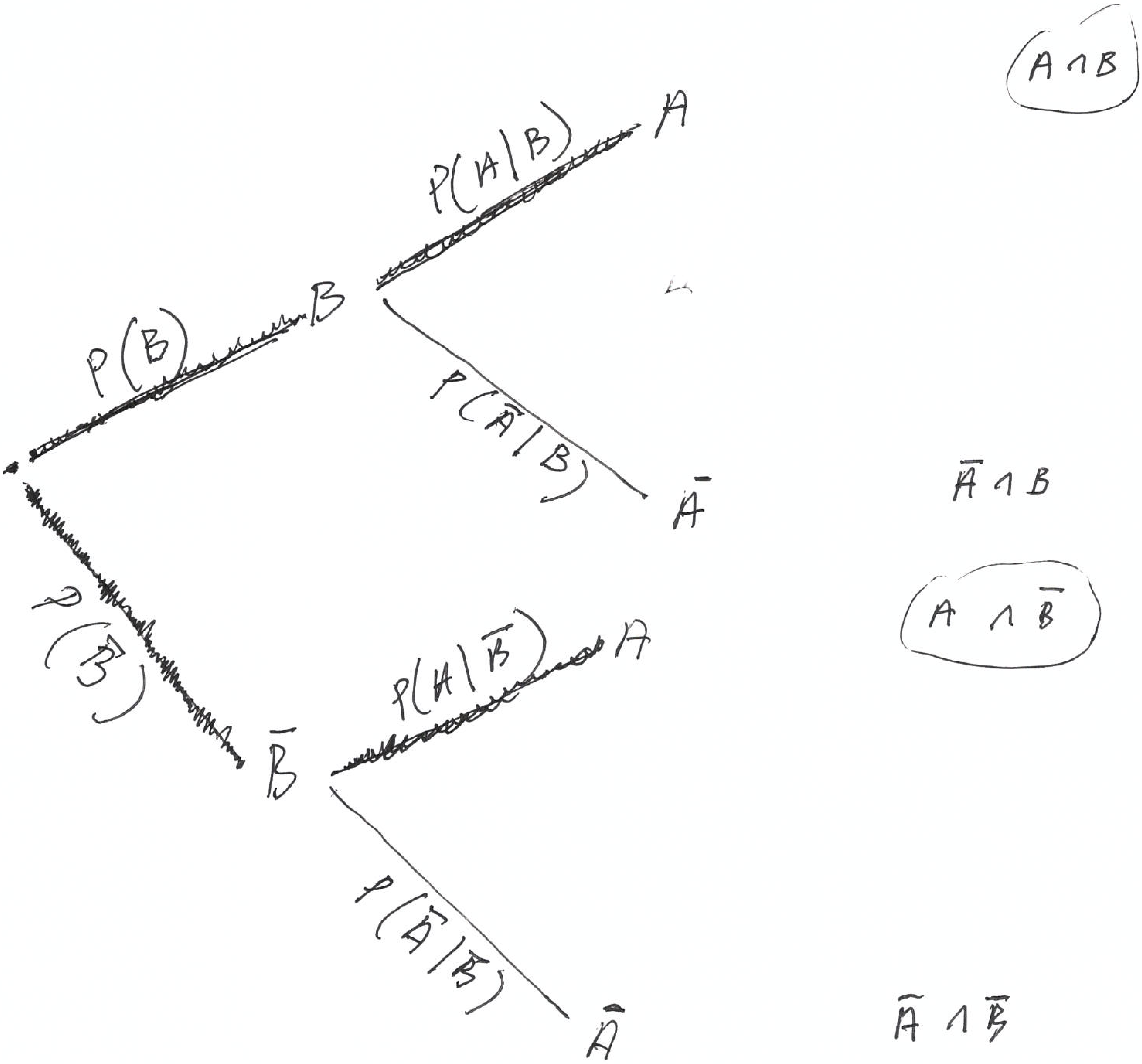
$$A = (A \cap B) \cup (A \cap \bar{B})$$

$$P(A) = P(A \cap B) + P(A \cap \bar{B})$$

$$= P(A|B) \times P(B) + P(A|\bar{B})\, P(\bar{B})$$

BAYES

$$P(B|A) = \frac{P(A \cap B)}{P(A)} = \frac{P(A|B) \times P(B)}{P(A|B) \times P(B) + P(A|\bar{B})P(\bar{B})}$$



B malato $\quad\quad \bar{B}$ non malato

$P(B) = 0.2$ (incidenza)

A positivo ad un Test

$\bar{A}$ negativo al Test

$P(A|B) = 0.9$ (sensibilità)

$P(\bar{A}|B) = 0.1$ (falsonegativo)

$P(A|\bar{B}) = 0.3$ (falso positivo)

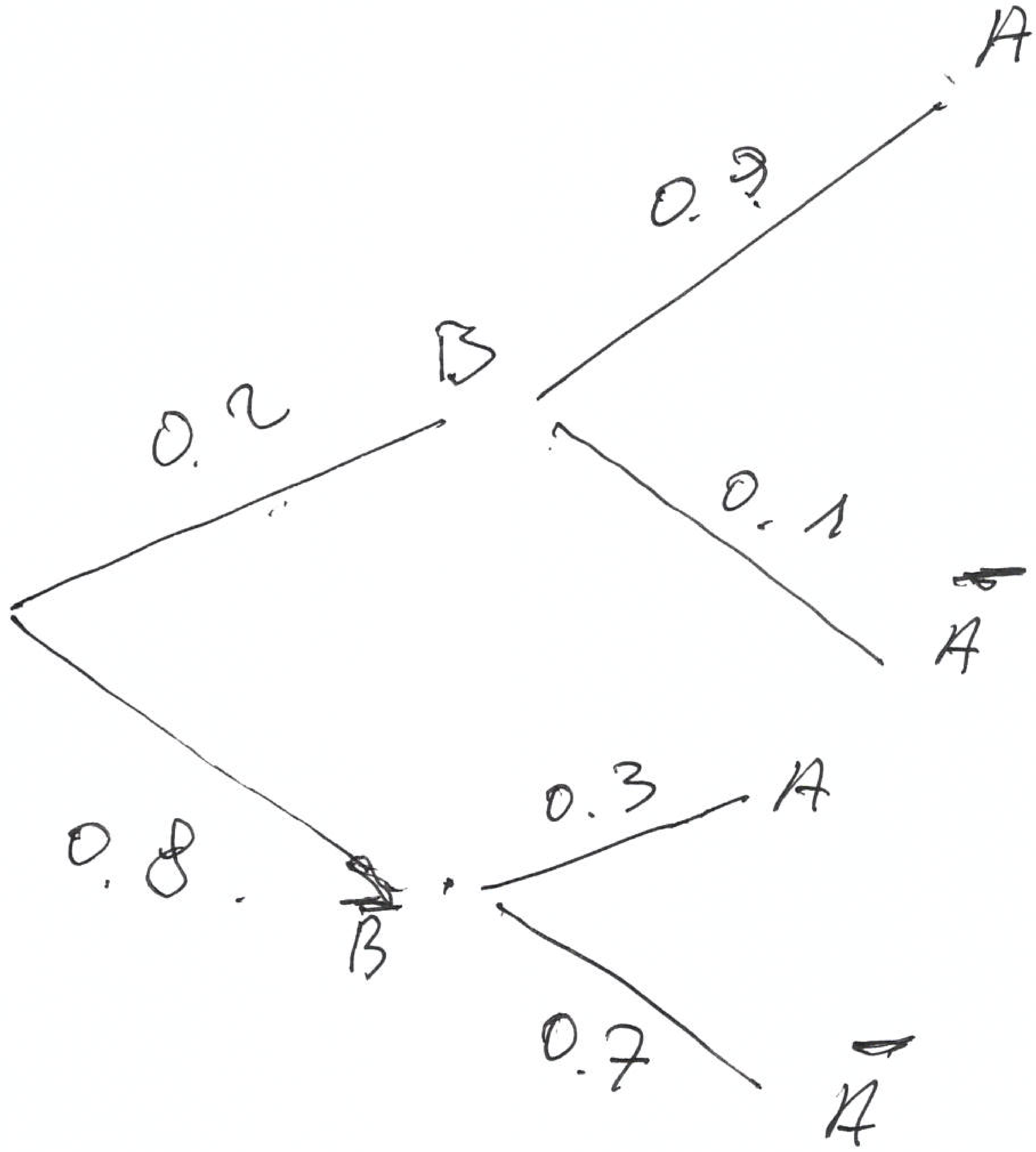
$P(\bar{A}|\bar{B}) = 0.7$ (specificità)

$$P(B|A) = \frac{0.9 \times 0.2}{0.9 \times 0.2 + 0.3 \times 0.8} = 0.429$$

$$P(B \cap A) + P(\bar{B} \cap \bar{A}) = 0.2 \times 0.9 + 0.8 \times 0.7 = 0.74$$

$$P(B|\bar{A}) = \frac{0.2 \times 0.1}{0.2 \times 0.1 + 0.8 \times 0.7} \simeq 0.035$$

TEST MEDICO



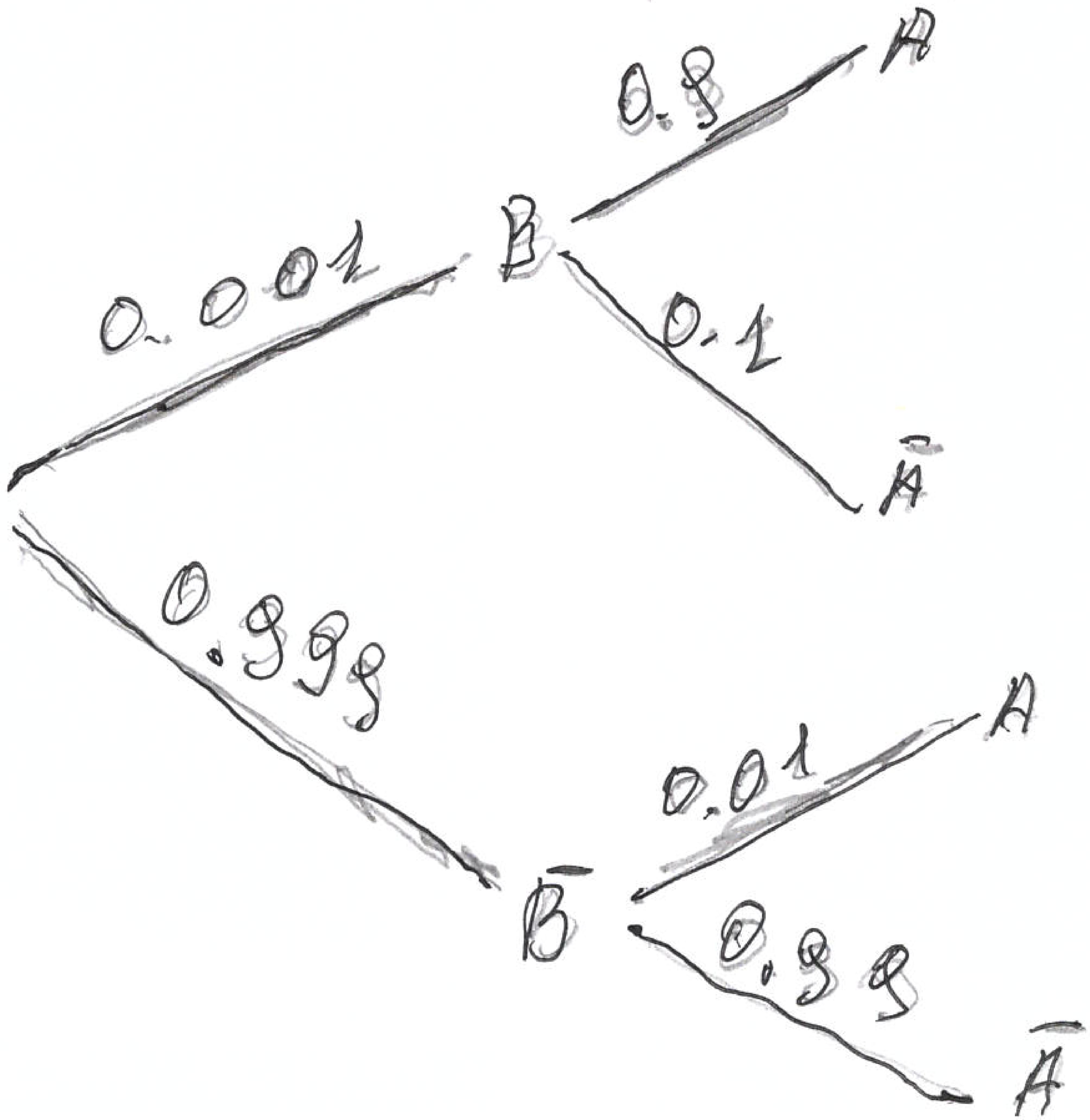
$A \cap B$

$\bar{A} \cap B$

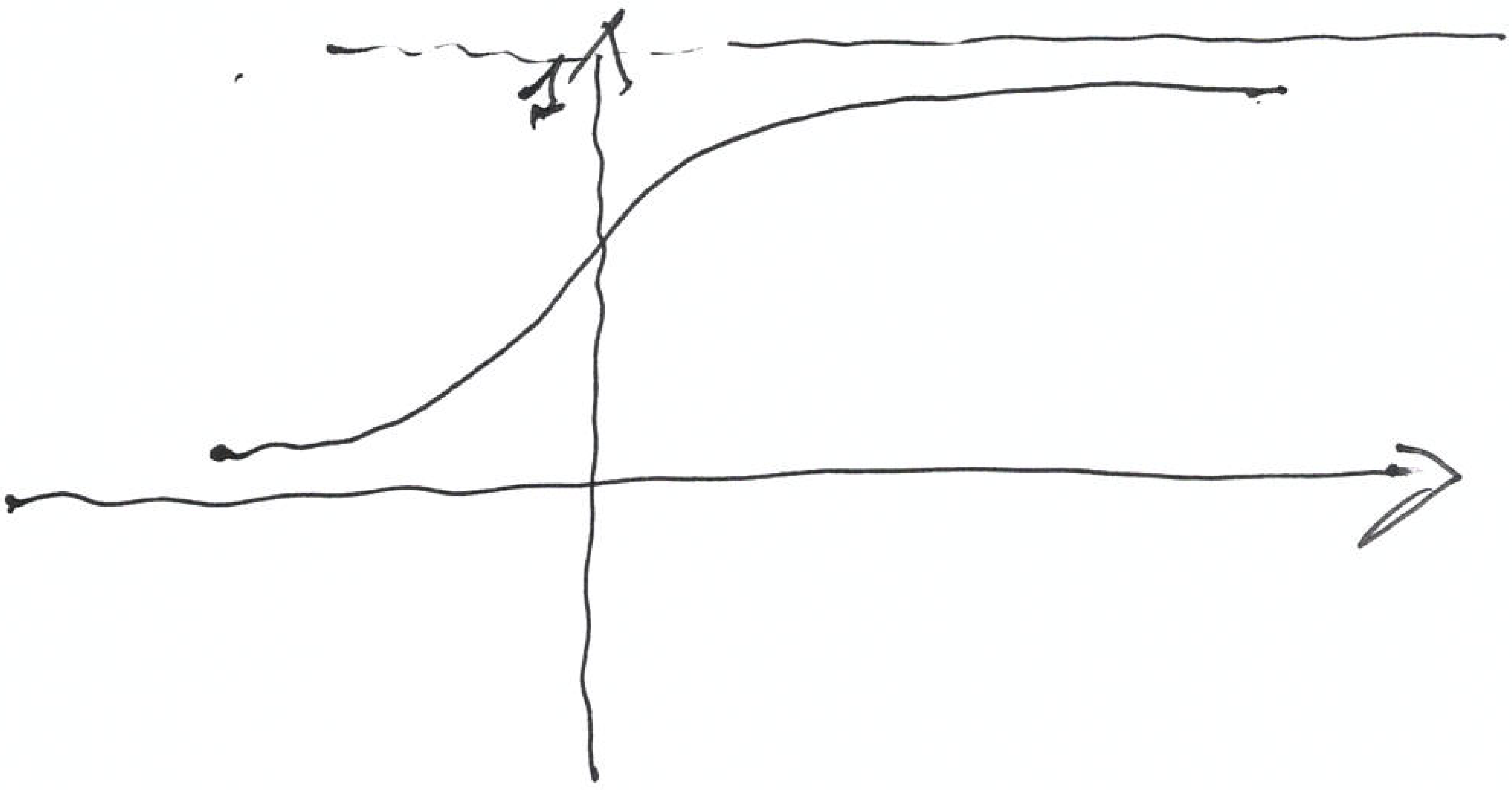
$A \cap \bar{B}$

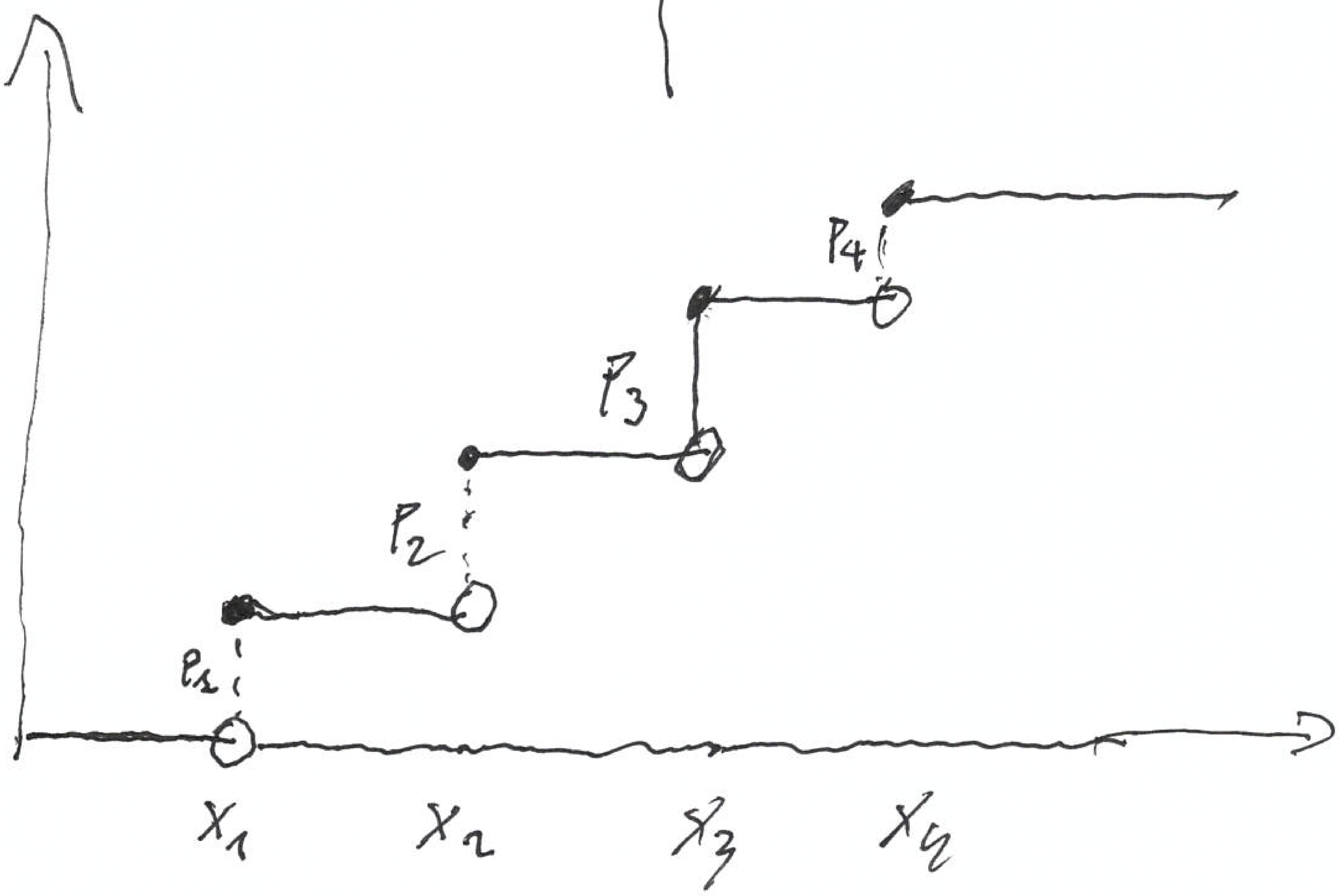
$\bar{A} \cap \bar{B}$

G.Q.



FUNZIONI DI RIPARTIZIONE





X	P
x_1	p_1
x_2	p_2
x_3	p_3
x_4	p_4
	1

$$\mu = E(X)$$

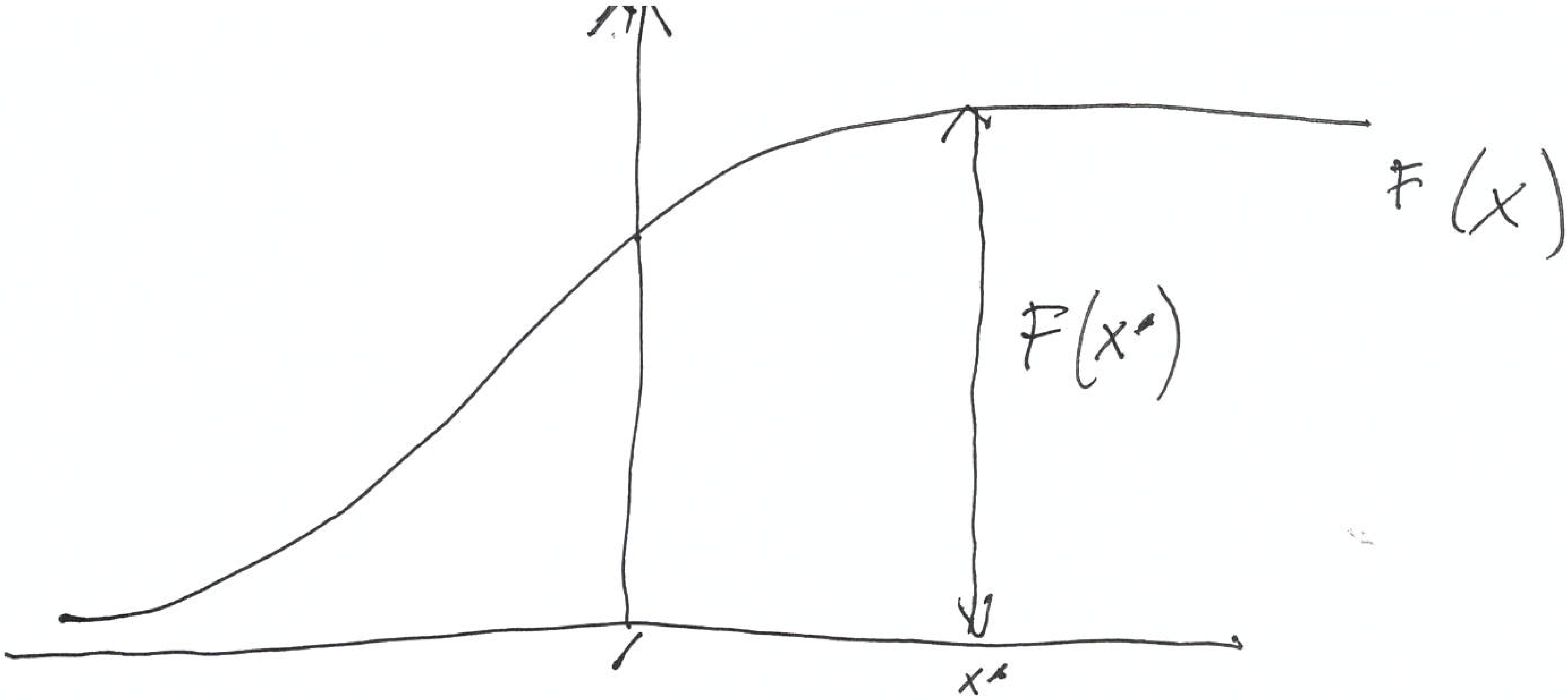
$$\sigma^2 = E(X-\mu)^2 = E\left(X^2 + \mu^2 - 2\mu X\right) =$$

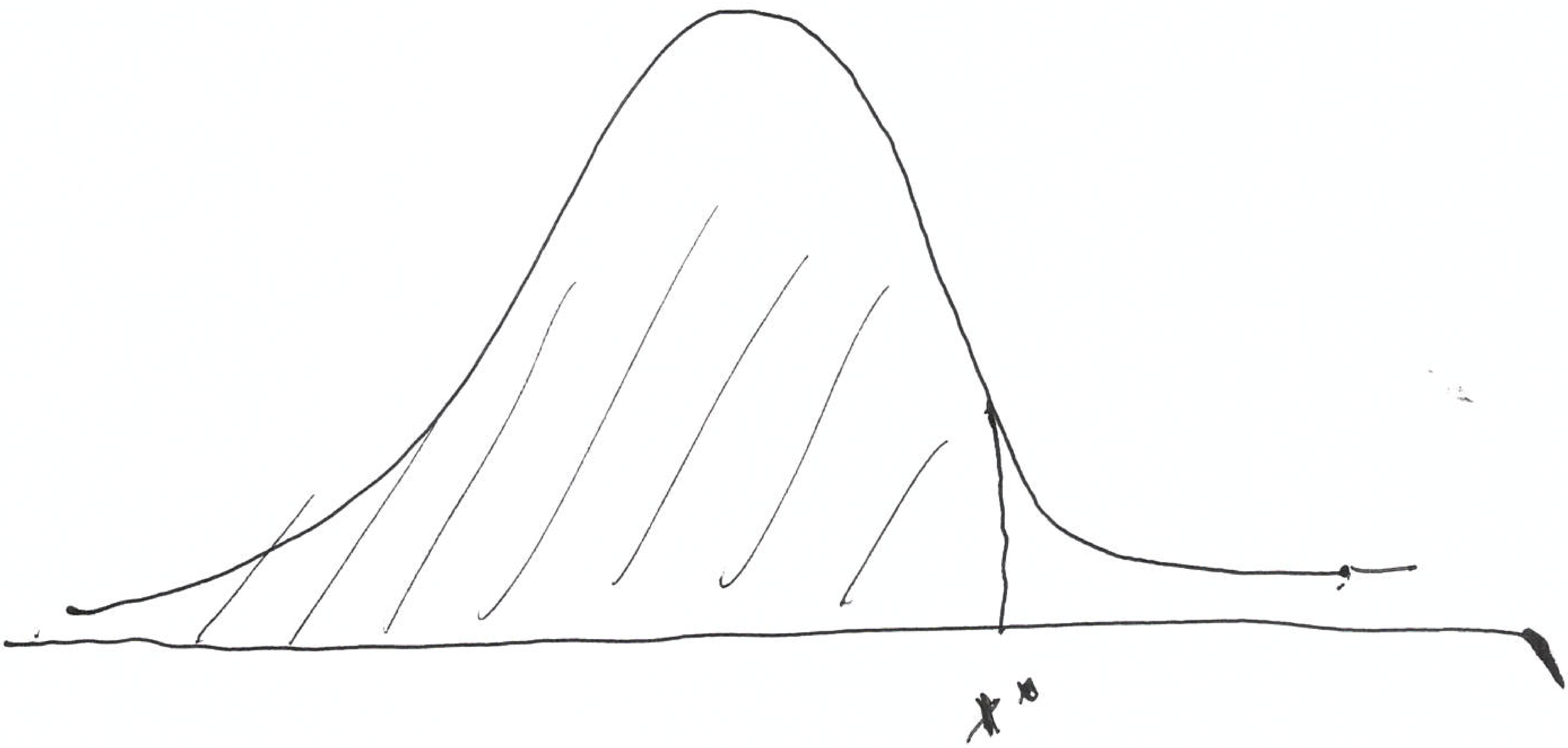
$$= E(X^2) + \mu^2 - 2\mu E(X) =$$

$$= E(X^2) + \mu^2 - 2\mu^2 = E(X^2) - \mu^2$$

$$E\left[X(X-1)\right] = E(X^2) - E(X) = E(X^2) - \mu$$

$$\sigma^2 = E\left(X(X-1)\right) + \mu - \mu^2$$





$$F(x^*) = \int_{-\infty}^{x^*} f(z)\, dz$$