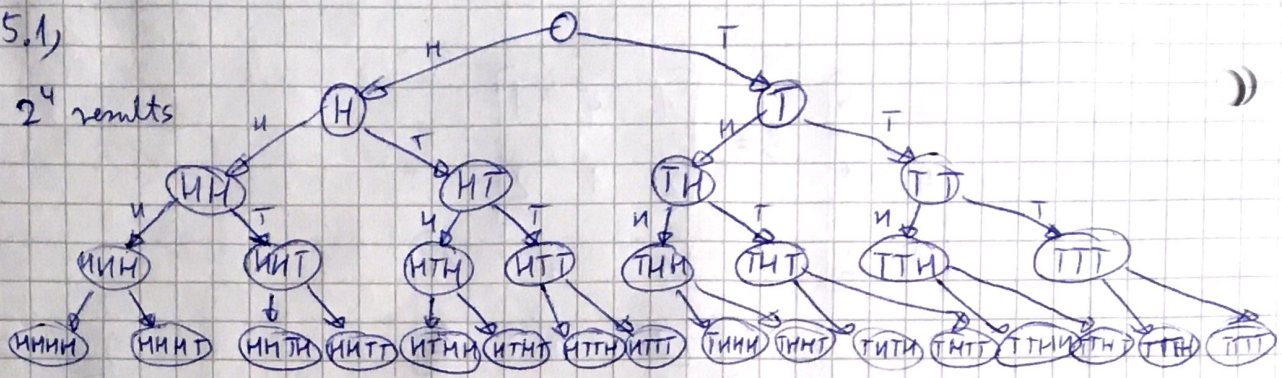
5, PROBABILITY THEORY

5.1,

2^4 results



5.2,

Test Result

DRUG USER	POS	NEG
D	99% 0,99	1% 0,01
–	0,5% 0,005	99,5% 0,995

$P(D) = 0{,}01 \quad (1\%)$

$P(D \mid POS) = ?$

BAYES' THEOREM:

$$P(D \mid POS) = \frac{P(POS \mid D) \cdot P(D)}{P(POS)} =$$

$$= \frac{0{,}99 \cdot 0{,}01}{0{,}99 \cdot 0{,}01 + 0{,}01 \cdot 0{,}005} = \frac{0{,}99}{0{,}995} \approx 99{,}5\%$$

5.3,

ASSUMING A FAIR DIE

$$E(X) = \sum_{i=1}^{6} \underbrace{\frac{1}{6}}_{p_i} \cdot \underbrace{i}_{x_i} = \frac{1+2+3+4+5+6}{6} = \frac{21}{6} = 3{,}5$$

2 INDEPENDENT TRIES: $2 \cdot E(X) = 2 \cdot 3{,}5 = 7$