1) a) $A \cup B$

b) $A \cap B$

c) $A \setminus B$

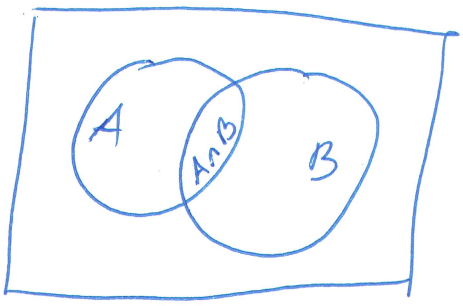
d) $(A \setminus B) \cup (B \setminus A)$

e) $A' \cap B'$

2) $P(A') = \frac{1}{3}$ $\quad P(A) = \frac{2}{3}$

$P(A \cap B) = \frac{1}{4}$ $\quad P(B) = \frac{1}{4}$ $\quad P(B') = \frac{3}{4}$

$P(A \cup B) = \frac{2}{3}$



$$P(A \setminus B) = P(A) - P(A \cap B) = \frac{2}{3} - \frac{1}{4} = \frac{8}{12} - \frac{3}{12} = \frac{5}{12}$$

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

$$\frac{2}{3} = \frac{2}{3} + P(B) - \frac{1}{4}$$

$$\frac{1}{4} = P(B)$$

$$P(A \cap B') = P(A \setminus B) = \frac{2}{3} - \frac{1}{4} = \frac{8}{12} - \frac{3}{12} = \frac{5}{12}$$

$$P(B \setminus A) = \frac{1}{4} - \frac{1}{4} = 0$$

3)

4)

(A1) $\forall A \in \mathcal{F} \quad P(A) \geq 0$

(A2) $P(\Omega) = 1$

(A3) $A_1, A_2, \ldots \quad A_i \cap A_j = \emptyset$ dla $i \neq j$

$P: \mathcal{F} \to \mathbb{R}$

$\Omega = \mathbb{N} = \{1, 2, 3, \ldots\}$

a) $P(\{n\}) = \frac{1}{\sqrt{n}}, \quad n \in \mathbb{N}$

$\{n\} = \omega_n$

A1 +

$P(\{1\}) = 1$

$P(\{2\}) = \frac{1}{\sqrt{2}}$

$P(\{1 \cup 2\}) = 1 + \frac{1}{\sqrt{2}} > 1$

42 —

b) $P(\{n\}) = c \cdot (-1)^{n+5} / \sqrt{n}$ dla pewego $c \in \mathbb{R}$ i $n \in \mathbb{N}$

$c = 0 : \forall_n \; P(\{n\}) = 0 \Rightarrow P(\Omega) = 0$ 42 —

c) $P(\{n\}) = c \setminus n^2$ dla $c \in R$ i $n \in N$

$c > 0$

$P(\Omega) = 1 = P\left(\bigcup_{n=1}^{\infty} \{n\}\right) = \sum_{n=1}^{\infty} P(\{n\}) = \sum_{n=1}^{\infty} \frac{c}{n^2} =$

$= c \sum_{n=1}^{\infty} \frac{1}{n^2}$

⑤ $\binom{49}{6} = \frac{49!}{(49-6)!\,6!} = \frac{44 \cdot 45 \cdot 46 \cdot 47 \cdot 48 \cdot 49}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6} =$

$= 13\ 983\ 816$

$P = \frac{1}{13\ 983\ 816}$

⑥ 6 BIAŁYCH, 2 CZARNE } 8

A – 3 BIAŁE i 1 CZARNA

$\overline{\Omega} = \binom{8}{4} = \frac{8!}{4!\,4!} = \frac{5 \cdot 6 \cdot 7 \cdot 8}{1 \cdot 2 \cdot 3 \cdot 4} = 70$

$\overline{A} = \binom{6}{3}\binom{2}{1} = \frac{6!}{3!\,3!} \cdot \frac{2!}{1!\,1!} = \frac{4 \cdot 5 \cdot 6}{1 \cdot 2 \cdot 3} \cdot 2 = 40$

$P(A) = \frac{\overline{A}}{\overline{\Omega}} = \frac{40}{70} = \frac{4}{7}$

7)

A – DWIE OSOBY URODZIŁY SIĘ W TYM SAMYM DNIU

B – RÓŻNE DNI (KAŻDY W INNYM DNIU)

$\Omega = 100\% = P(A) + P(B)$

$\Omega = (365)^{365}$

$B = \frac{365!}{(365-365)!\,365^{365}}$

dla $m = 365$

dla $m = 30$

$B = \frac{365!}{(365-30)!\,365^{30}} = \frac{365!}{335!\,365^{30}} \approx 0{,}2937$

$A = 1 - 0{,}2937 = 0{,}7063$

dla $m = 40$

$B = \frac{365!}{(365-40)!\,365^{40}} = \frac{365!}{325!\,365^{40}} \approx 0{,}1088$

$A = 1 - 0{,}1088 = 0{,}8912$

8) $\Omega = \{(x_1; x_2; x_3 \dots; x_{10}) : x_i \in \{O; R\}, i = 1; \dots 10\}$

OREŁ RESZKA

$|\Omega| = 2^{10} = 1024$

$|A| = 1$

$P(A) = \frac{1}{1024}$

9) $\Omega = \{x_1; x_2; x_3; x_i \in \{1, 2, \dots, 6\}, i = 1, 2, 3\}$

$x_i \rightarrow$ WYNIK i RZUTU

$|\Omega| = 6^3 = 216$

a) $A \rightarrow$ ZA KAŻDYM RAZEM INNA LICZBA OCZEK

$|A| = 6 \cdot 5 \cdot 4$

$P(A) = \frac{6 \cdot 5 \cdot 4}{6 \cdot 6 \cdot 6} = \frac{5}{9}$

b) B – ZAWSZE TA SAMA LICZBA OCZEK

$|B| = 6 \cdot 1 \cdot 1 = 6$

$P(B) = \frac{6 \cdot 1 \cdot 1}{6 \cdot 6 \cdot 6} = \frac{1}{36}$

(10) $|\Omega_1| = 6^6$

$|\Omega_2| = 6^{12}$

$|\Omega_3| = 6^{18}$

A – WYPADEK 1×6

B = WYPADEK 2×6

C = — — 3×6

$P(A') = \frac{5^6}{6^6}$

$P(A) = 1 - \frac{5^6}{6^6} \approx 0,6651$

$P(B') = \frac{5^{12}}{6^{12}} + \frac{\binom{12}{1} \cdot 5^{11}}{6^{12}} = \frac{5^{12}}{6^{12}} + \frac{12 \cdot 5^{11}}{6^{12}}$

$P(B) = 1 - \left(\frac{5^{12}}{6^{12}} + \frac{12 \cdot 5^{11}}{6^{12}} \right) =$

$\approx 0,38$

$P(C') = \frac{5^{18}}{6^{18}} + \binom{18}{1} \cdot \frac{5^{17}}{6^{18}} + \binom{18}{2} \cdot \frac{5^{16}}{6^{18}} = \frac{5^{18}}{6^{18}} + 18\frac{5^{17}}{6^{18}} +$

$+ 153 \frac{5^{16}}{6^{18}} \approx 0,0376 + 0,1352 + 0,2299$

$= 0,4026$

$P(C) = 1 - 0,4026 = 0,5974$

(11) $\Omega = 10^6$

A – WSZYSCY WYSIĄDĄ NA 10

B – WSZYSCY WYSIĄDĄ NA 12 TYM SAMYM

$P(A) = \frac{9^6}{10^6}$

$P(A) = 1 - \frac{9^6}{10^6} = 0{,}4686$

$P(B) = \frac{12 \cdot 10}{10^6}$

$P(A) = \binom{12}{1} \cdot \frac{10}{10^6} = 12 \cdot \frac{1}{10^5}$

$P(A) = \binom{10}{1} \cdot \frac{10}{10^6} = 10 \cdot \frac{10}{10^6}$

$P(A) = \frac{\binom{10}{1}}{10^6} = \frac{10^1}{10^6}$

7) $\Omega = 10!$

A - BUT LEVÝ I PRAVÝ KAŽDÝ

~~$10!$~~

$A = 2^5 \cdot (5!)^2$

$P(A) = \frac{2^5 \cdot (5!)^2}{10!}$

B - PAREČ

$B = 2^5 \cdot 5!$

$P(B) = \frac{2^5 \cdot 5!}{10!}$

C - SVOJA PAREČ

$C = 5^2$

$P(C) = \frac{5^2}{10!}$

(13) $\overline{\overline{\Omega}} = 10!$ A - POMIĘDZY 2 i 3 SĄ 4 CYFRY

$2 \times\times\times 3 \times\times\times\times$
$\times 2 \times\times\times\times 3 \times\times\times$
$\times\times 2 \times\times\times\times 3 \times\times$
$\times\times\times 2 \times\times\times\times 3 \times$
$\times\times\times\times 2 \times\times\times\times 3$

$A = 5 \cdot 2! \cdot 8!$

$P(A) = \frac{5 \cdot 2! \cdot 8!}{10!}$

B - 0, 1, 2 STOJĄ OBOK SIEBIE

$012 \times\times\times\times\times\times\times$
$\times 012 \times\times\times\times\times\times$
$\times\times 012 \times\times\times\times\times$
$\times\times\times 012 \times\times\times\times$
$\times\times\times\times 012 \times\times\times$
$\times\times\times\times\times 012 \times\times$
$\times\times\times\times\times\times 012 \times$
$\times\times\times\times\times\times\times 012$

$B = 8 \cdot 3! \cdot 7!$

$P(B) = \frac{8 \cdot 3! \cdot 7!}{10!}$

14) $\bar{\bar{\Omega}} = 18!$ A – PARZYSTE NA MIEJSCU PARZYSTYM

$\times 2 \times 4 \ldots 18 \times$

$A = 9! \cdot 10!$

$P(A) = \frac{9! \cdot 10!}{19!}$

15) I, I, I, I, M, P, P, S, S, S, S

4 – I

1 – M

2 – P

4 – S

A – MISSISSIPPI

$\bar{A} = 1$

$\bar{\bar{\Omega}} = \frac{11!}{4! \cdot 1 \cdot 2! \cdot 4!}$

$P(A) = \frac{1}{\frac{11!}{4! \cdot 1 \cdot 2! \cdot 4!}}$

16) ~~$\bar{\bar{\Omega}} = 8!$~~

~~A – ŻADNA DZIEC NIE STOI OBOK SIEBIE~~

~~$A = 4! \cdot 4! \cdot 2$~~ DMDMDMDM ~~$A = \binom{8}{4} \cdot 4! \cdot 4!$~~

~~$A = 4! \cdot 4! \cdot 2$~~ MDMDMDMD

16) a) $|\Omega| = 8!$

b)

A – ŻADNE DWIE DZIEWCZYNKI NIE STOJĄ OBOK SIEBIE

D → DZIEWCZYNKA

C → CHŁOPIEC

DCDCDCDC

CDCDCDCD + PERMUTACJE

$|A| = 2 \cdot 4! \cdot 4!$

$P(A) = \frac{2 \cdot 4! \cdot 4!}{8!}$

c) $|\Omega| = 7!$

B – ŻADNE DWIE DZIEWCZYNKI NIE SIEDZĄ OBOK SIEBIE

$|B| = 4! \cdot 4!$

$P(B) = \frac{4! \cdot 4!}{7!}$

(17) $\overline{\overline{\Omega}} = 99$

A – PODZIELNA PRZEZ 2 B – PODZIELNA PRZEZ 3

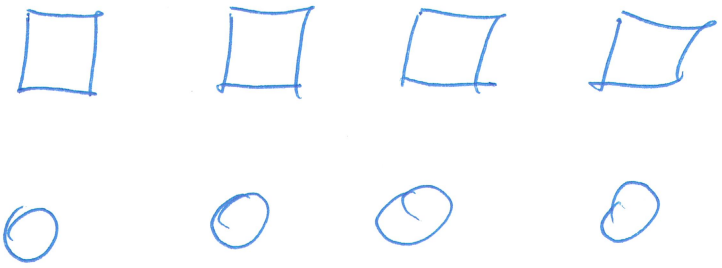
$\overline{\overline{A}} = 49$

$\overline{\overline{B}} = 33$

$\overline{\overline{A \cap B}} = 16$

$P(A) = \frac{49 + 33 - 16}{99}$

(18)



$\overline{\overline{\Omega}} = 4!$

A – CO NAJMNIEJ 1 LIST POBRY

B_i – LIST „i" POBRY

$A = B_1 \cup B_2 \cup B_3 \cup B_4$

$P(A) = \sum_{1 \le i \le 4} P(B_i) - \sum_{1 \le i < j \le 4} P(B_i \cap B_j) + \sum_{1 \le i < j < k \le 4} P(B_i \cap B_j \cap B_k) -$

$- P(B_1 \cap B_2 \cap B_3 \cap B_4)$

$P(B_i) = \frac{3!}{4!} \rightarrow i = 1,2,3,4$

$P(B_i \cap B_j) = \frac{2!}{4!} \rightarrow i \neq j$, $i,j = 1,2,3,4$

$P(B_i \cap B_j \cap B_k) = \frac{1}{4!} \rightarrow i \neq j \neq k$, $i,j,k = 1,2,3,4$

$P(B_1 \cap B_2 \cap B_3 \cap B_4) = \frac{1}{4!}$

$P(A) = 4 \cdot \frac{3!}{4!} - \binom{4}{2}\frac{2!}{4!} + \binom{4}{3}\frac{1}{4!} - \frac{1}{4!} =$

$P(A) = P(B_1 \cup B_2 \cup \dots \cup B_n) = n \frac{(n-1)!}{n!} - \binom{n}{2}\frac{(n-2)!}{n!} + \binom{n}{3}\frac{n-3!}{n!} + \dots + (-1)^{n+1}\frac{1}{n!} = 1 - \frac{1}{2!} + \frac{1}{3!} + \dots + (-1)^{n+1}\cdot\frac{1}{n!}$

(19) $\bar{\bar{\Omega}} = 3^{10}$

A – JEDNA SZUFLADA PUSTA

A' – TYLKO W DWÓCH POZOSTAŁYCH ↔ TYLKO W JEDNEJ, TYLKO DWOMA

$\bar{\bar{A}} = 2^{10}$

$P(A) = \binom{3}{1} \cdot \frac{2^{10}}{3^{10}} - 3\frac{1}{3^{10}}$

(c) $\Omega = \{O, RO, RRO, RRRO, \dots\}$

$\omega_1 \quad \omega_2 \quad \omega_3 \quad \omega_4$

$\omega_i = \underbrace{R \dots R}_{i-1} O \rightarrow i = 1, 2, \dots$

$P(A) = \sum_{i:\omega_i \in A} P(\{\omega_i\})$

$A = \{RRO\}$ — DOKŁADNIE 3 RZUTY

ω_3

$P(A) = P(\{\omega_3\}) = \left(\frac{1}{2}\right)^3 = \frac{1}{8}$

$B = \{RRRO, RRRRO, \dots\}$ CO NAJMNIEJ 3

$\omega_4 \quad \omega_5$

$P(B) = P(\{\omega_4\}) + P(\{\omega_5\}) + \dots$

$P(\{\omega_1\}) = P(\{O\}) = \frac{1}{2}$

$P(\{\omega_2\}) = P(\{RO\}) = \frac{1}{4} = \left(\frac{1}{2}\right)^2$

$P(\{\omega_3\}) = P(\{RRO\}) = \frac{1}{8} = \left(\frac{1}{2}\right)^3$

$P(\{\omega_k\}) = \left(\frac{1}{2}\right)^k \rightarrow k = 1, 2, 3$

(20) $B' = \{\omega_1; \omega_2; \omega_3\}$

$P(B) = 1 - P(B') =$

$= 1 - \frac{1}{2} - \frac{1}{4} - \frac{1}{8} = 0{,}125$

$C \rightarrow$ WYKONANO PARZYSTĄ LICZBĘ

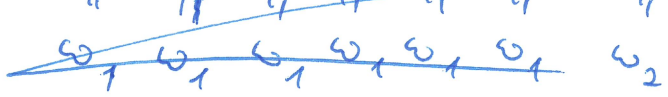
$C = \{\omega_2; \omega_4; \dots \omega_{2n}\}$

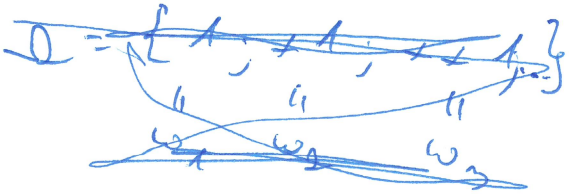
$P(C) = P(\{\omega_2\}) + P(\{\omega_4\}) + \dots P(\{\omega_{2n}\}) =$

$= \sum_{n=1}^{\infty} P(\{\omega_{2n}\}) = \sum_{n=1}^{\infty} \left(\frac{1}{2}\right)^{2n} = \sum_{n=1}^{\infty} \left(\frac{1}{4}\right)^{n} =$

$= \frac{\frac{1}{4}}{1-\frac{1}{4}} = \frac{\frac{1}{4}}{\frac{3}{4}} = \frac{1}{4} \cdot \frac{4}{3} = \frac{4}{12} = \frac{1}{3}$

(21) $\Omega = \{1; 2; 3; 4; 5; 6; 11; 12; 13 \dots\}$





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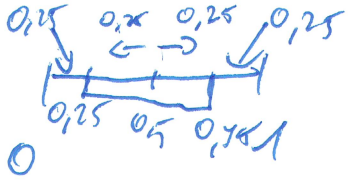


$0,25 + 0,25 = 0,5$

$P = \frac{1}{2}$

23

$r = r - 1$

$A = r^2 = A$

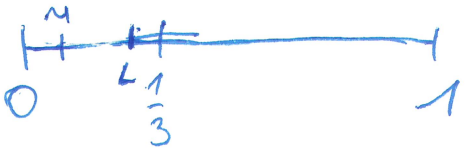
$O = \pi R^2$

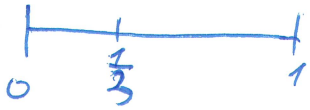
$A = \pi r^2$

$P(A) = \pi r^2 \quad r^2$

$\pi R^2 \quad R^2$

25





(25)

A – LEŽÍ

~~A' – NELEŽÍ~~

$A = 1^2 + \pi(0,5)^2 = 1^2 + 0,25\pi$

$P(A) = 1 - 1 + 0,25\pi$

$P(A) = 0,25\pi$

(26) $\Omega = 3$

$A = 2$

$P(A) = \frac{2}{3}$

(27) $P(A) = 0,7$

$P(B) = 0,9$

$P(A') = 0,3$

$P(C) = 0,3 \cdot 0,9 = 0,27$

(28) $P(A) = 0,5$

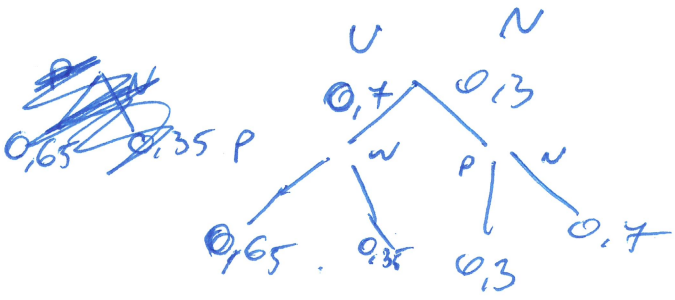
$P(B) = 0,001$

$P(C) = 0,8$

$P(D) = 0,5 \cdot 0,001 \cdot 0,8 = 0,0004$

D → 2 JEDLOVÉ

(29)



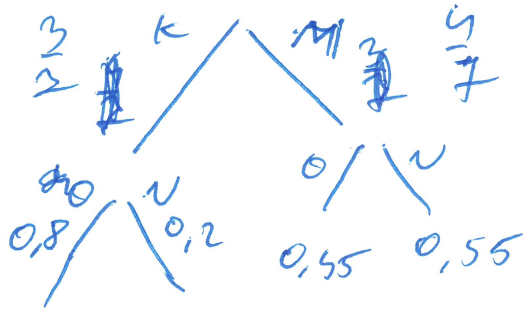
$P = 0,65 \cdot 0,7 + 0,3 \cdot 0,3$

$P = 0,455 + 0,09 = 0,545$

31) $\Omega = 2000 + 1500 = 3500$

$P(K) = \frac{2000}{3500} = \frac{20}{35} = \frac{4}{7}$ ZAMIENIĆ

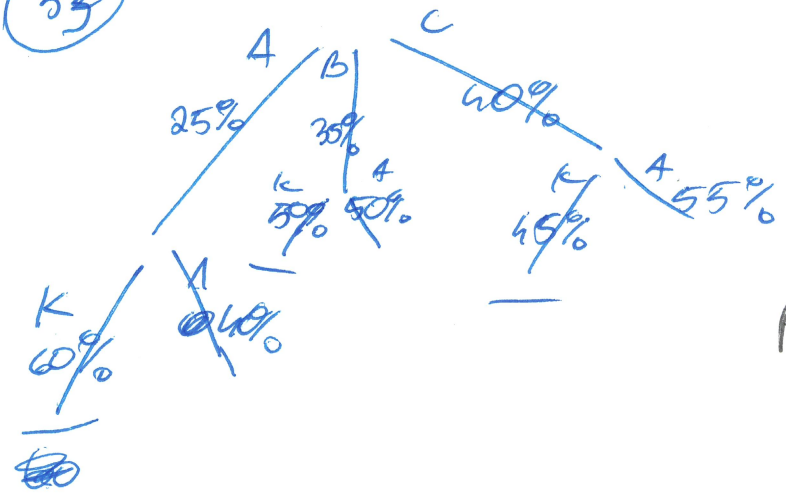
$P(M) = \frac{1500}{3500} = \frac{3}{7}$



$P = \frac{3}{7} \cdot 0,8 + \frac{4}{7} \cdot 0,45 =$

$= 0,6$

33)



K – JEST NA KARTCE

A – SIEĆ A

B – – – B

C – – – C

$P(A) = 0,25$

$P(K) = P(K|A)P(A) + P(K|B)P(B) + P(K|C)P(C) =$

~~$= 0,6 \cdot 0,25 + 0,5 \cdot 0,3 + 0,45 \cdot 0,4 =$~~

~~$= 0,45 + 0,15 + 0,18 = 0,48$~~

$= 0,6 \cdot 0,25 + 0,5 \cdot 0,35 + 0,45 \cdot 0,4 = 0,505$

$$P(A|K) = \frac{P(K|A)P(A)}{P(K)} = \frac{0,6 \cdot 0,25}{0,505} \approx 0,295$$

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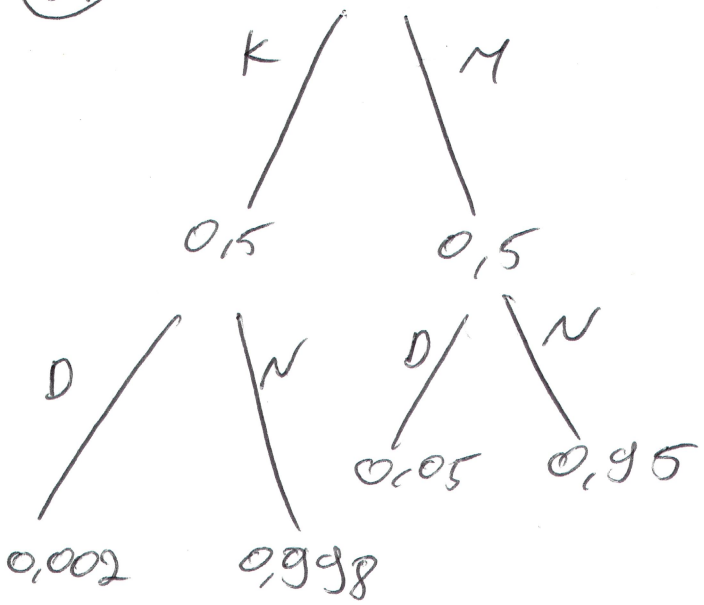


$$P(D) = P(D|K) \cdot P(K) + P(D|M) \cdot P(M) =$$

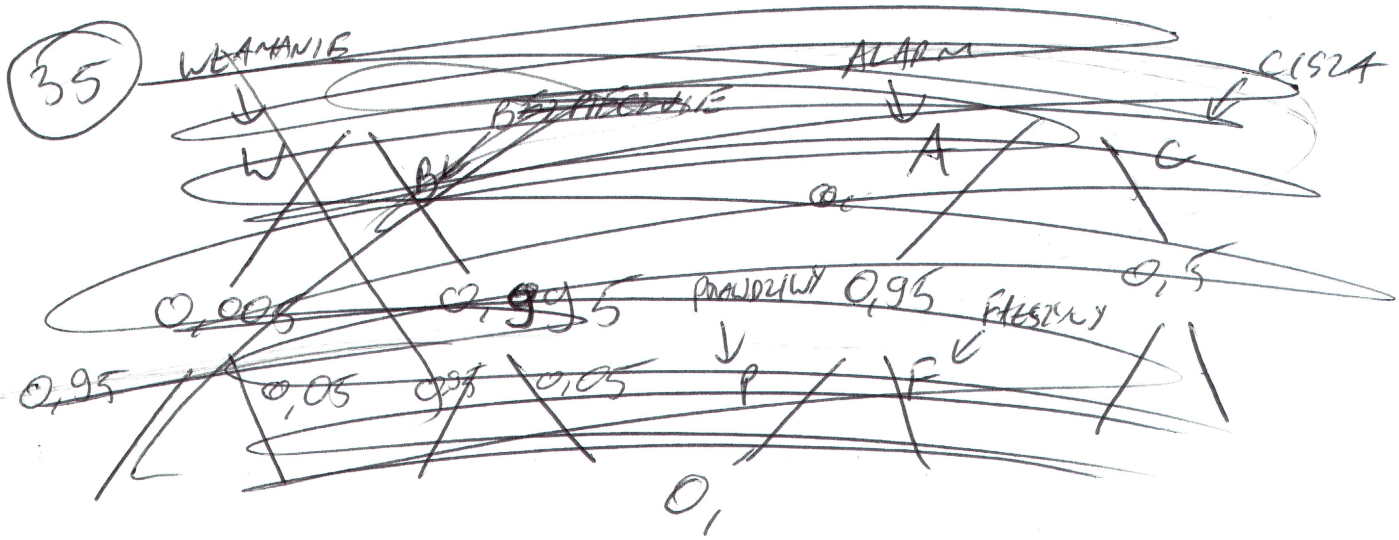
$$= 0,002 \cdot 0,5 + 0,05 \cdot 0,5 =$$

$$= 0,001 + 0,025 =$$

$$= 0,026$$

$$P(M|D) = \frac{P(D|M) \cdot P(M)}{P(D)} = \frac{0,025}{0,026} \approx 0,961$$

35



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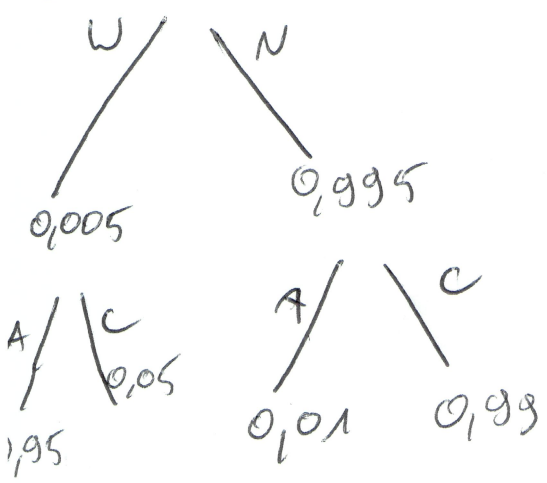


$P(W|A) = ?$

$P(A) = P(A|W) \cdot P(W) + P(A|N) \cdot P(N) =$

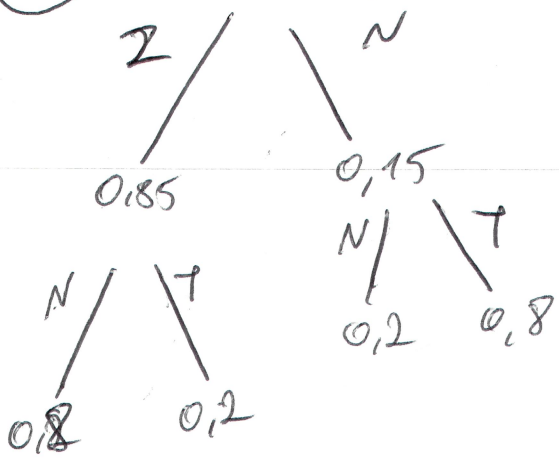
$= 0,95 \cdot 0,005 + 0,01 \cdot 0,995 =$

$= 0,00475 + 0,00995 =$

$= 0,01470$

$$P(W|A) = \frac{P(A|W)P(W)}{P(A)} = \frac{0,00475}{0,01470} \approx 0,32$$

36



$P(N|T)$

$P(T) = 0,8 \cdot 0,15 + 0,2 \cdot 0,85 =$

$= 0,12 + 0,17 = 0,29$

$P(N|T) = \frac{P(T|N)\,P(N)}{P(T)} =$

$= \frac{0,8 \cdot 0,15}{0,29} = \frac{0,12}{0,29} \approx 0,41$

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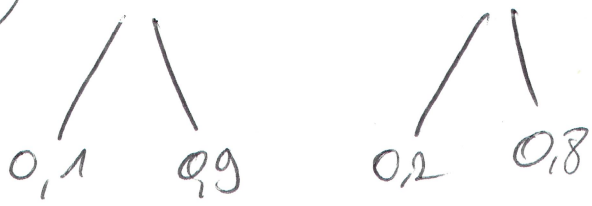
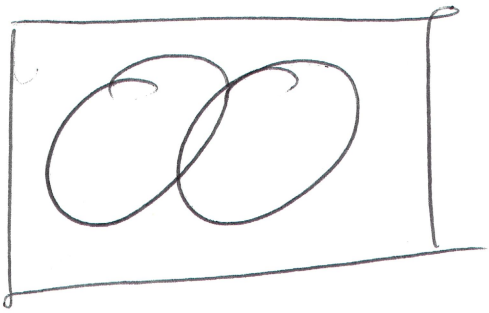




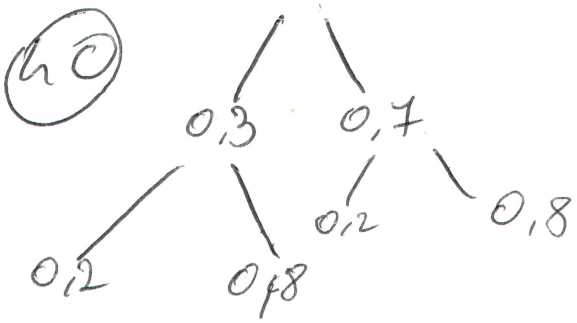
$0,1 + 0,2 - 0,1 \cdot 0,2 =$

$= 0,3 - 0,02 = 0,28$

39

$3 \cdot \frac{1}{3} - \binom{3}{2} \frac{1}{3} \cdot \frac{1}{3} + \frac{1}{3} \cdot \frac{1}{3} \cdot \frac{1}{3} = \frac{7}{9}$

40



$0,7 \cdot 0,8 = 0,56$

(41) A_i - dioda $\Rightarrow i = 1;2$

A_1 ; A_2 $\Rightarrow$ NIEZALEŻNE

$P(A_1) = P(A_2) = 0,9$ $\quad P(A_1') = 0,1$

$P(A_1' \cap A_2') = ?$ $\quad P(A_2') = 0,1$

$P(A_1' \cap A_2') = 0,1 \cdot 0,1 = 0,01$

(42) $A_i \Rightarrow$ w i zdarzeniu wygrała orzeł

$i = 1; 2; 3;$

$\Omega = \{ OOO, OOR, ORO, ROO, RRO, RRR, RRR, ROR, ORR \}$

$A_1 = \{ ORR, OOO, ORO, OOR \}$

$A_2 = \{ OOO, ROR, OOR, ROO \}$

$A_3 = \{ OOO, RRO, ORO, ROO \}$

a) $P(A_1 \cap A_2) = P(A_1) \cdot P(A_2) = \frac{1}{4}$

$\frac{1}{4} = \frac{2}{8} = P(A_1 \cap A_3) = P(A_1) P(A_3) = \frac{1}{4}$

$\frac{1}{4} = \frac{2}{8} = P(A_2 \cap A_3) = P(A_2) P(A_3) = \frac{1}{4}$

$$\frac{1}{8} = P(A_1 \cap A_2 \cap A_3) = P(A_1)P(A_2)P(A_3) = \frac{1}{8}$$

$$P(A_1) = P(A_2) = P(A_3) = \frac{4}{8} = \frac{1}{2}$$

---

(43)

$\Omega = 4$

$C = 1\frac{1}{3}$

$B = 1\frac{1}{3}$

$2 = 1\frac{1}{3}$

$$P(C) = \frac{1\frac{1}{3}}{4} = 0,33$$

$P(B) = 0,33$

$P(2) = 0,33$

$$\frac{1}{4} = P(C \cap B) \overset{?}{=} P(C)P(B) = \frac{4}{3} \cdot \frac{4}{3} = \frac{8}{6} = 1,33$$

NIE SĄ NIEZALEŻNE

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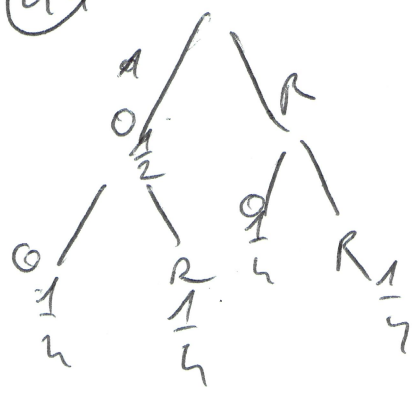
(44)



$\frac{1}{8} : A = \{\underset{\frac{1}{4}}{OR};\ \underset{\frac{1}{4}}{OO}\}$

$B = \{\underset{\frac{1}{2}}{OO},\ \underset{\frac{1}{2}}{RO}\}$

$C = \{\underset{\frac{1}{2}}{OR},\ \underset{\frac{1}{2}}{RO}\}$

Ω {OO; RO; OR; RR
OO; RO; OR; RR}

$$0 = P(A \cap B) \overset{?}{=} P(A)P(B) = \frac{1}{8} \cdot \frac{1}{8} = \frac{1}{16}$$

NIE SĄ NIEZALEŻNE PONIEWAŻ NIE MOŻE JEDNOCZEŚNIE WYPAŚĆ W PIERWSZEJ TURZE OR i OO

$$\frac{1}{4} = \frac{2}{8} = P(A_1 \cap A_2) \overset{\times}{=} P(A_1)P(A_2) = \frac{1}{4}$$

$$\frac{1}{4} = \frac{2}{8} = P(A_1 \cap A_3) \overset{\times}{=} P(A_1)P(A_3) = \frac{1}{4}$$

$$\frac{1}{4} = \frac{2}{8} = P(A_2 \cap A_3) \overset{\times}{=} P(A_2)P(A_3) = \frac{1}{4}$$

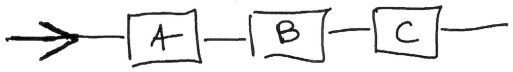
$$\frac{1}{8} = P(A_1 \cap A_2 \cap A_3) \overset{\times}{=} P(A_1)P(A_2)P(A_3) = \frac{1}{8}$$

$$P(A_1) = P(A_2) = P(A_3) = \frac{4}{8} = \frac{1}{2}$$

Zatem A_1, A_2 i A_3 są niezależne

45

(a)



A – "obiekt przekroczy A"
B – " " " B
C – " " " C

$P(A) = P(B) = P(C) = p = 0,9$

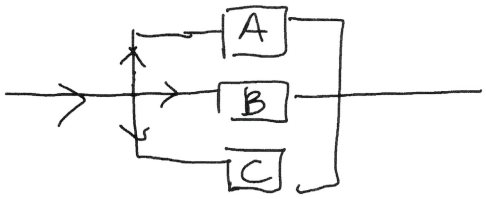
A, B, C – niezależne

S – "przekroczenie sygnału przez układ przekaźników"

$$S = A \cap B \cap C$$

$$P(S) = P(A \cap B \cap C) = P(A)P(B)P(C) = p^3 = 0,9^3 = 0,729$$

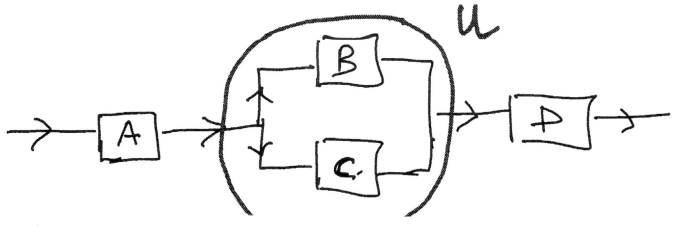
(b)



$$S = A \cup B \cup C$$

$$P(S) = \boxed{P(A \cup B \cup C) = 1 - P(A' \cap B' \cap C')} = 1 - \underbrace{P(A')}_{1-P(A)}\underbrace{P(B')}_{1-P(B)}\underbrace{P(C')}_{1-P(C)} = 1 - (1-p)(1-p)(1-p) = 1 - (1-p)^3 = 1 - 0,1^3 = 0,999$$

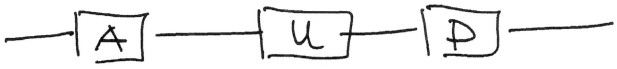
(c)



A, B, C, D – niezależne

$P(A) = P(B) = P(C) = P(D) =$

$= n - n e$

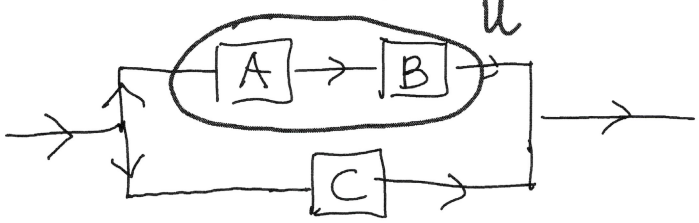


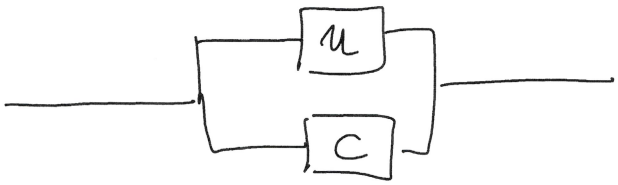
$$P(S) = P(A \cap U \cap D) =$$
$$= \underbrace{P(A)}_{p} P(U) \underbrace{P(D)}_{p}$$

$$P(U) = P(B \cup C) = 1 - P(B' \cap C') =$$
$$= 1 - \underbrace{P(B')}_{1-p} \underbrace{P(C')}_{1-p}$$
$$= 1 - (1-p)^2$$

$$P(S) = p^2 [1 - (1-p)^2] = 0{,}8^2 [1 - 0{,}1^2] =$$
$$= 0{,}81 \cdot 0{,}99 = 0{,}8019$$

(d)





$$P(S) = P(U \cup C) = 1 - P(U' \cap C') =$$
$$= 1 - P(U') P(C') =$$
$$= 1 - [1 - P(U)] (1-p)$$

$$P(U) = P(A \cap B) = P(A) P(B) = p^2$$

$$P(S) = 1 - (1-p^2)(1-p) =$$

$= 1 - 0{,}19 \cdot 0{,}1 = 0{,}981$

Kolokwium 1 → 7/11/2020

45 min → 2 potoma zajęć

Inspera ⇔ 14[15] - 15

3 krótkie zadania ~ 30 min

+ 15 min

⑨ - - - - → [:-:]