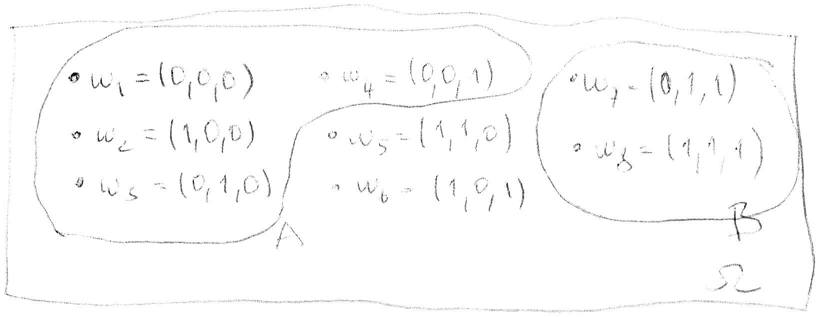
1)



A … je v ní méně než 2 dívky

B … poslední 2 děti jsou dívky

2) $P(K) = 0{,}1 \quad P(S) = 0{,}06 \quad P(K \cap S) = 0{,}02$

$$P(K \cup S) = P(K) + P(S) - P(K \cap S) = 0{,}1 + 0{,}06 - 0{,}02 = \underline{0{,}14}$$

3) a) $P(V) = \underline{0{,}3}$

b) $P(M_V | V) = 0{,}9 \quad P(M_V | V^c) = 0{,}2$

$$P(V|M_V) = \frac{P(V \cap M_V)}{P(M_V)} = \frac{P(M_V|V) \cdot P(V)}{P(M_V|V) \cdot P(V) + P(M_V|V^c) \cdot P(V^c)} =$$

$$= \frac{0{,}9 \cdot 0{,}3}{0{,}9 \cdot 0{,}3 + 0{,}2 \cdot 0{,}7} = \underline{0{,}659}$$

4) $x_1 = 10, \ x_2 = 20, \ x_3 = 30, \ x_4 = 50, \ x_5 = 90$

délka $\widehat{EX} = \overline{X} = \frac{\sum_{i=1}^{5} x_i}{5} = \frac{10+20+30+50+90}{5} = \underline{40}$

plocha $\widehat{EX^2} = \overline{x^2} = \frac{\sum x_i^2}{5} = \frac{10^2+20^2+30^2+50^2+90^2}{5} = \frac{12\,000}{5} = 2400$

$40^2 \neq 2400$ průměrnou rozlohu nelze vyjádřit umocněním průměrné délky, důvodem je že neplatí:

$$\left(\frac{\sum x_i}{n}\right)^2 = \frac{\sum x_i^2}{n}$$

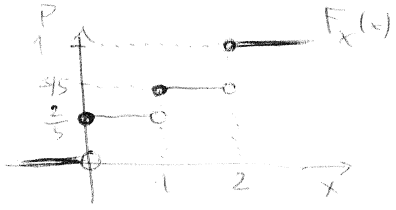
5) z vlastností F je možné určit limity, jsou tyto monotonie, počet bodů skoku

6)

P	$Y=-1$	$Y=1$	$Y=2$	$Y=3$	
$X=0$					$14/35 = 2/5$
$X=1$					$7/35 = 1/5$
$X=2$					$14/35 = 2/5$
Σ	$15/35$	$5/35$	$10/35$	$5/35$	1

$$F_X(x) = \begin{cases} 0 & \text{pro } x<0 \\ 2/5 & \text{pro } 0 \le x < 1 \\ 3/5 & 1 \le x < 2 \\ 1 & 2 \le x \end{cases}$$

... marginální distribuční funkce náhodné veličiny X



$$EX = 0\cdot\frac{2}{5} + 1\cdot\frac{1}{5} + 2\cdot\frac{2}{5} = 1 \qquad EX^2 = 0^2\cdot\frac{2}{5} + 1^2\cdot\frac{1}{5} + 2^2\cdot\frac{2}{5} = \frac{9}{5}$$

$$\text{var}X = E(X^2 - EX) = EX^2 - (EX)^2 = \frac{9}{5} - 1^2 = \frac{4}{5}$$

$$EY = -1\cdot\frac{3}{7} + 1\cdot\frac{1}{7} + 2\cdot\frac{2}{7} + 3\cdot\frac{1}{7} = \frac{5}{7}$$

$$EY^2 = (-1)^2\cdot\frac{3}{7} + 1^2\cdot\frac{1}{7} + 2^2\cdot\frac{2}{7} + 3^2\cdot\frac{1}{7} = \frac{21}{7} = 3$$

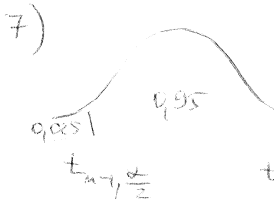
$$\text{var}Y = EY^2 - (EY)^2 = 3 - \left(\frac{5}{7}\right)^2 = \frac{147-25}{49} = \frac{122}{49}$$

$$E(X\cdot Y) = 0\cdot(-1)\cdot\frac{6}{35} + 0\cdot 1\cdot\frac{2}{35} + 0\cdot 2\cdot\frac{4}{35} + 0\cdot 3\cdot\frac{2}{35} +$$
$$+ 1\cdot(-1)\cdot\frac{3}{35} + 1\cdot 1\cdot\frac{1}{35} + 1\cdot 2\cdot\frac{2}{35} + 1\cdot 3\cdot\frac{1}{35} +$$
$$+ 2\cdot(-1)\cdot\frac{6}{35} + 2\cdot 1\cdot\frac{2}{35} + 2\cdot 2\cdot\frac{4}{35} + 2\cdot 3\cdot\frac{2}{35} = \frac{25}{35} = \frac{5}{7}$$

$$\text{cov}(X,Y) = E[(X-EX)\cdot(Y-EY)] = E(X\cdot Y) - EX\cdot EY = \frac{5}{7} - 1\cdot\frac{5}{7} = 0$$

$$\rho_{X,Y} = \frac{\text{cov}(X,Y)}{\sqrt{\text{var}X}\cdot\sqrt{\text{var}Y}} = \frac{0}{\sqrt{\frac{4}{5}}\cdot\sqrt{\frac{122}{49}}} = 0$$

7)



$$W = (-\infty; t_{n-1;\frac{\alpha}{2}}) \cup (t_{n-1;1-\frac{\alpha}{2}}; \infty)$$

8) $\hat{\lambda}_D = \frac{\sum_{i=1}^{6} x_i}{6} = \frac{105+107+85+72+58+33}{6} = 76{,}3$

$$\hat{\lambda}_T = \frac{\sum_{i=1}^{5} y_i}{5} = \frac{5+33+40+59+28}{5} = 29$$

$$P(\xi_D < 25) = \sum_{\xi_D=0}^{24} \frac{\hat{\lambda}_D^{\xi_D}}{\xi_D!}\cdot e^{-\hat{\lambda}_D} = \text{výpočet na počítači} = 2{,}5\cdot 10^{-12}$$

$$P(\xi_T < 25) = \sum_{\xi_T=0}^{24} \frac{\hat{\lambda}_T^{\xi_T}}{\xi_T!}\cdot e^{-\hat{\lambda}_T} = 0{,}204$$