

1.) $X_i = 1$, je-li i -ty volajici muš
 $= 0$, není-li - " $\left. \vphantom{\sum_{i=1}^{150} X_i} \right\} X_i \sim \text{Alt}(0,6) \Rightarrow E X_i = 0,6; \text{var } X_i = 0,24$
 $\forall i = 1, \dots, 150$

$$P\left(\sum_{i=1}^{150} X_i \leq 75\right) = P\left(\underbrace{\frac{\sum X_i - 150 \cdot 0,6}{\sqrt{150 \cdot 0,24}}}_Z \leq \underbrace{\frac{75 - 150 \cdot 0,6}{\sqrt{150 \cdot 0,24}}}_{-2,5}\right) = \Phi(-2,5) = 1 - \Phi(2,5) =$$

$$= 1 - 0,994 = \underline{\underline{0,006}}$$

2.) X_i ... doba mezi $(i-1)$. a i . volajici'm $\Rightarrow X_i \sim \text{Exp}(0,5) \Rightarrow E X_i = 2, \text{var } X_i = 4; i = 1, \dots, 100$

$$P\left(\sum_{i=1}^{100} X_i \geq 180\right) = P\left(\underbrace{\frac{\sum X_i - 100 \cdot 2}{\sqrt{100 \cdot 4}}}_Z \geq \underbrace{\frac{180 - 100 \cdot 2}{\sqrt{100 \cdot 4}}}_{-1}\right) = P(Z \geq -1) = 1 - P(Z \leq -1) =$$

$$= 1 - \Phi(-1) = \Phi(1) = \underline{\underline{0,8413}}$$

NEBO:

Y_i ... počet volajici'ch v i -te minutě $\Rightarrow Y_i \sim B(0,5) \Rightarrow E Y_i = 0,5 = \text{var } Y_i; i = 1, \dots, 180$

$$P\left(\sum_{i=1}^{180} Y_i \leq 100\right) = P\left(\underbrace{\frac{\sum Y_i - 180 \cdot 0,5}{\sqrt{180 \cdot 0,5}}}_Z \leq \underbrace{\frac{100 - 180 \cdot 0,5}{\sqrt{180 \cdot 0,5}}}_{-1}\right) = \Phi(1) = \underline{\underline{0,8413}}$$

2.) 1.) $E X = \int_{-\infty}^{\infty} x f(x) dx = \int_{-\infty}^0 x \cdot 0 dx + \int_0^{\infty} x \cdot c^2 \cdot x e^{-cx} dx = \dots = \frac{2}{c} \Rightarrow \hat{E X} = \frac{2}{c}$

$$\hat{E X} = \bar{x} = \frac{2 + 2,5 + 1 + 10 + 5}{5} = \frac{10,5}{5} = 4,1 \Rightarrow \left[\frac{2}{\hat{c}} = 4,1 \Rightarrow \hat{c} = \underline{\underline{\frac{20}{41}}} \right] \leftarrow$$

2.) $L(c) = c^2 \cdot 2 \cdot e^{-2c} \cdot c^2 \cdot 2,5 \cdot e^{-2,5c} \cdot \dots \cdot c^2 \cdot 5 \cdot e^{-5c} = 250 c^{10} e^{-10,5c}$

$$\ell(c) = \ln L(c) = \ln 250 + 10 \ln c - 10,5c$$

$$\ell'(c) = \frac{10}{c} - 10,5 \Rightarrow \frac{10}{\hat{c}} - 10,5 = 0$$

$$\hat{c} = \underline{\underline{\frac{20}{41}}}$$