2. DOMAĆA ZADAĆA

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1.) 5% da će se pošiljka vratiti pošiljatelju. Ukupno 100 paketa.

X = pošiljka koja se vraća pošiljatelju

Poissonova distribucija:

a) 5 pošiljka se vraća pošiljatelju

$E(X) = \lambda = 0{,}05 \cdot 100 = 5$ $\quad P(X=x) = e^{-\lambda} \cdot \frac{\lambda^x}{x!} = e^{-5} \cdot \frac{5^5}{5!} = 0{,}1755 \cdot 100\% =$

$X = 5$

$P(X=x) = \underline{17{,}55\%}$

b) $X > 10$ $\quad P(x>10) = 1 - P(x \leq 10) = 1 - [P(x=0) + P(x=1) + P(x=2) + P(x=3) +$

$+ P(x=4) + P(x=5) + P(x=6) + P(x=7) + P(x=8) + P(x=9) + P(x=10)] =$

$= 1 - \left[e^{-5} \cdot \left(\frac{5^0}{0!} + \frac{5^1}{1!} + \frac{5^2}{2!} + \frac{5^3}{3!} + \frac{5^4}{4!} + \frac{5^5}{5!} + \frac{5^6}{6!} + \frac{5^7}{7!} + \frac{5^8}{8!} + \frac{5^9}{9!} + \frac{5^{10}}{10!}\right)\right] =$

$= 1 - [e^{-5} \cdot 146{,}3806] = 1 - 0{,}9863 = 0{,}0137 \cdot 100\% = \underline{1{,}37\%}$

2.) Varijabla normalne razdiobe: $350 = \mu$ = očekivani broj nesreća

$70 = \sigma$ = standardno odstupanje

X = broj prometnih nesreća $\quad P(X \leq a) = F(a) = \Phi\left(\frac{a-\mu}{\sigma}\right)$

a) $P(x \leq 400) = F(400) = \Phi\left(\frac{400-350}{70}\right) = \Phi\left(\frac{50}{70}\right) = \Phi(0{,}7143)$

TABLICA: STUPAC $\Phi(z)$ uz $z = 0{,}71$ $\quad \Phi(z) = 0{,}7611 \cdot 100\% = \underline{76{,}11\%}$

b) $P(X \leq 300) = F(300) = \Phi\left(\frac{300-350}{70}\right) = F\left(\frac{-50}{70}\right) = \Phi(-0{,}7143)$

TABLICA: STUPAC $\Phi(-z)$ uz $z = 0{,}71$ $\quad \Phi(-z) = 0{,}2389 \cdot 100\% = \underline{23{,}89\%}$

3.) 1 min = 10 puta; 1 min = 60 sek

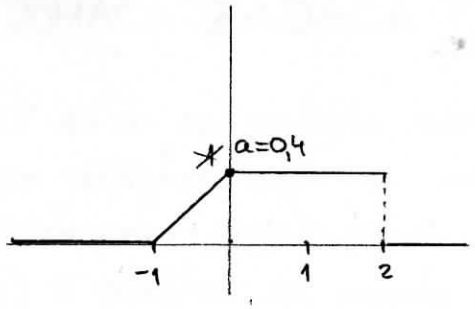
a) $E(X) = 60 : 10 = 6$ $\quad E(X) = \frac{1}{\lambda} \rightarrow \lambda = \frac{1}{E(X)} = \underline{\frac{1}{6}}$

$P(X \leq 5) = F(5) = 1 - e^{-\lambda \cdot a} = 1 - e^{-\frac{1}{6} \cdot 5} = 0{,}5654 \cdot 100\% = \underline{56{,}54\%}$

b) $P(X \leq 30) = F(30) = 1 - e^{-\frac{1}{6} \cdot 30} = 0{,}9933 \cdot 100\% = \underline{99{,}33\%}$

c) $P(X > 10) = 1 - F(10) = e^{-\frac{1}{6} \cdot 10} = 0{,}1889 \cdot 100\% = 18{,}89\%$

4.)



mijeti: 1) $f(t) \geq 0$ ✓

2) $\int_{-\infty}^{\infty} f(t)dt = 1$ — ne zadovoljava

a) $\int_{-\infty}^{\infty} f(t)dt = \frac{1}{2}a + 2a \rightarrow \frac{1}{2}a + 2a = 1$

$a(\frac{1}{2}+2) = 1$

$\frac{5}{2}a = 1 \ / \cdot \frac{5}{2}$

$a = 0,4$

b) $E(X) = \int_{-\infty}^{\infty} t\, f(t)dt$

$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$

$f(t) - 0 = \frac{0,4 - 0}{0 - (-1)}(t - (-1))$

$f(t) = 0,4(t+1)$

$$f(t) = \begin{cases} 0 & t \leq -1 \\ 0,4(t+1) & -1 \leq t \leq 0 \\ 0,4 & 0 \leq t \leq 2 \\ 0 & 2 < t \end{cases}$$

c) $-1 \leq x < 0$

$$F(x) = \int_{-\infty}^{x} f(t)dt = \int_{-\infty}^{-1} 0 \cdot dt + \int_{-1}^{x} 0,4(t+1)\,dt =$$

$$= 0,4\,\frac{(t+1)^2}{2}\Big|_{-1}^{x} = 0,2(x+1)^2 - 0 =$$

$$= 0,2(x+1)^2$$

$$\begin{cases} \emptyset & x \leq -1 \\ 0,2(x+1)^2 & -1 \leq x < 0 \\ 0,2 + 0,4x & 0 \leq x < 2 \\ 1 & 2 \leq x \end{cases}$$

FUNKCIJA DISTRIBUCIJE

d) $0 \leq x < 2$

$$F(x) = \int_{-\infty}^{x} f(t)dt$$

$$= \int_{-\infty}^{-1} 0 + \int_{-1}^{0} 0,4(t+1)dt + \int_{0}^{x} 0,4\,dt = 0,2 + 0,4t\Big|_{0}^{x} = 0,2 + 0,4x$$

($\int_{-\infty}^{-1} 0 = \emptyset$, $\int_{-1}^{0} 0,4(t+1)dt = 0,2$)

$P(-1 \leq x \leq 1) = F(1) - F(-1) = 0,2 + 0,4 \cdot 1 - \emptyset = 0,6$

5.)

			f_i	F_i
11	3,4	3,4	2	2
12	6,2,2	2,2,6	3	5
13	2,4,9,4,0	0,2,4,4,9	5	10
14	6,5,9,0,5,2,9,5	0,2,5,5,5,6,9,9	8	18
15	6,7,9,3,1,5,2	1,2,3,5,⑥,7,9	7	25
16	1,4,4,9,0,3,4,3,3,5	0,1,3,3,3,4,4,4,5,9	10	35
17	9	9	1	36
18	6,7,6,4,5	4,5,6,6,7	5	41
19	4,4,2,8	2,4,4,8	4	45
			$\sum$ 45	

x_i	f_i	$\overline{x}_i$	$f_i \cdot \overline{x}_i$	$\overline{x}_i - \overline{x}$	$(\overline{x}_i - \overline{x})^2$	$(\overline{x}_i - \overline{x})^2 \cdot f_i$
113-125	4	119	476	-38	1444	5776
125-137	5	131	655	-26	676	3380
137-149	7	143	1001	-14	196	1372
149-161	10	155	1550	-2	4	40
161-173	9	167	1503	10	100	900
173-185	2	179	358	22	484	968
185-198	8	191	1528	34	1156	9248
	45		7071			21684

a) $k = 1 + \log_2 N = 1 + \log_2 45$

$k = 6,5 \rightarrow k = 7$

b) raspon $198 - 113 = 85$

$\Delta = \frac{\text{raspon}}{k} = \frac{85}{7} = 12,15 = \approx 12$

$Mod = 145, 163, 164$

$M_e = 156 \rightarrow$ 22 | 23 | 22 (MJESTO)

$\overline{x} = \frac{7071}{45} = 157,13 = \approx 157$

$\sigma^2(x) = \frac{\sum_{i=1}^{n} (\overline{x}_i - \overline{x})^2 \cdot f_i}{\sum_{i=1}^{n} f_i - 1} = \frac{21684}{44} = 492,82$

$\sigma^2(x) = 492,82 \ / \sqrt{\ }$

$\sigma(x) = 22,1995 = \approx 22$

STANDARDNA DEVIJACIJA