

Данная работа №1

№1

$$l = 0,4$$

$$t_{\text{рем}} = 3 \text{ мес.}$$

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

$A, q, \bar{k}, P_{\text{рем}} - ?$

$$p_0 = P(S_0), \quad p_1 = P(S_1)$$

$$\begin{cases} l p_0 = \mu p_1 \\ p_0 + p_1 = 1 \end{cases} \Rightarrow \begin{cases} p_0 = \frac{\mu}{l + \mu} = \frac{5}{11} \\ p_1 = \frac{l}{l + \mu} = \frac{6}{11} \end{cases}$$

$$P_{\text{рем}} = \frac{6}{11}$$

$$q = 1 - \frac{6}{11} = \frac{5}{11}$$

$$A = 0,4 \cdot \frac{5}{11} = \frac{2}{11}$$

$$\bar{k} = p_1 = \frac{6}{11}$$

$$k: \quad 0 \quad 1$$

$$p_0 \quad p_1$$

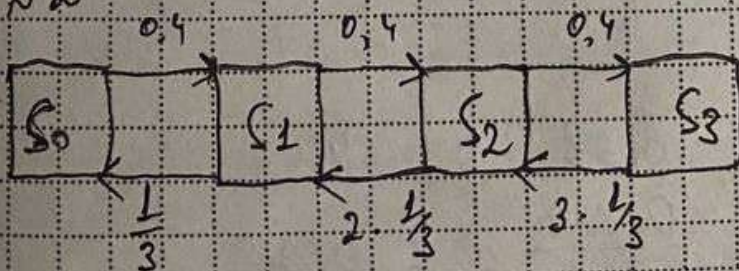
$$A_{\text{рем}} = \frac{60}{3} = 20 \text{ год.}$$

$$\frac{20}{60} = \frac{1}{3}$$

$$A_{\text{рем}} = \frac{1}{3} \text{ год/мес.} \Rightarrow$$

$$\Rightarrow \frac{2}{11} \cdot 3 = \frac{6}{11}$$

№2





$$d = 0,4$$

$$t_{\text{осн.}} = \frac{1}{3}$$

$$p = \frac{d}{t_{\text{осн.}}} = \frac{0,4}{1/3} = 1,2$$

$$\begin{cases} p_0 = \frac{1}{1 + \frac{p}{1!} + \frac{p^2}{2!} + \dots + \frac{p^n}{n!}} \\ p_k = \frac{p^k}{k!} \cdot p_0 \end{cases}$$

$$p_0 = \frac{1}{1 + 1,2 + \frac{1,44}{2} + \frac{1,728}{6}} = \frac{1}{1 + 1,2 + 0,72 + 0,288}$$

$$+ 0,288 \approx 0,31$$

$$p_1 = p \cdot p_0 = 1,2 \cdot \frac{1}{3,208} \approx 0,37$$

$$p_2 = \frac{p^2}{2!} \cdot p_0 = \frac{1,44}{2} \cdot \frac{1}{3,208} \approx 0,22$$

$$p_3 = \frac{p^3}{3!} \cdot p_0 = \frac{1,728}{6} \cdot \frac{1}{3,208} \approx 0,09$$

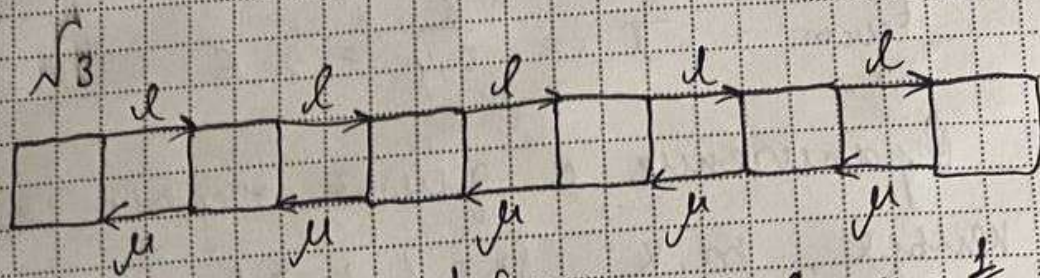
$$p_{\text{откл}} = p_n = p_3 \approx 0,09$$

$$q = 0,91$$

$$A = dq = 0,4 \cdot 0,91 = 0,364$$

$$\bar{k} = \frac{A}{t_{\text{осн.}}} = \frac{0,364}{1/3} \approx 1,092$$





$$d = 0,4 \quad m = 4 \quad t_{\text{order}} = 3 \quad n = 5 \quad \mu = \frac{1}{3}$$

$$p = 1,2$$

$$p/p_0 = \frac{1-p}{1-p^{m+2}}$$

$$p_n = p^n \cdot p_0$$

$$p_0 = \frac{1-1,2}{1-1,2^6} = 0,1$$

$$p_5 = 1,2^5 \cdot 0,1 \approx 0,25$$

$$p_{\text{order}} = p^5 = 0,25$$

$$q = 1 - 0,25 = 0,75$$

$$A = dq = 0,4 \cdot 0,75 = 0,3$$

$$\bar{r} = p^2 \cdot p_0 \cdot \frac{1 - p^m(m+1 - mp)}{(1-p)^2} =$$

$$= 1,2^2 \cdot 0,1 \cdot \frac{1 - 1,2^4 \cdot 6,2}{(1-1,2)^2} = 2,1$$

$$\bar{w} = 1 - 0,1 = 0,9$$

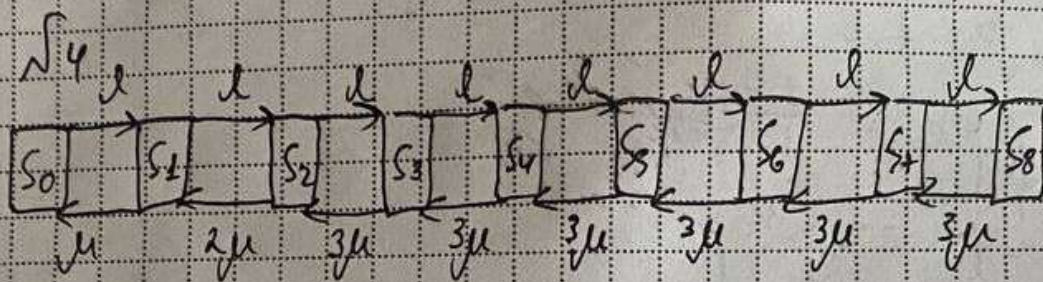
$$\bar{z} = \bar{r} + \bar{w} = 2,1 + 0,9 = 3$$

$$t_{\text{om}} = \frac{\bar{r}}{d} = \frac{2,1}{0,4} = 5,25$$



$$\bar{t}_{\text{сум.}} = \frac{\bar{t}}{z} = \frac{3}{0,4} = 7,5$$

Определение с группой опытов с числом  
критерия, м.к.  $p = 1, 2 > 1$



$$\lambda = 0,4 \quad m = 4, \quad n = 3, \quad \mu = \frac{1}{3}, \quad p = 1,2$$

$$p_0 = \left( 1 + 1,2 + \frac{1,2^2}{2!} + \frac{1,2^3}{3!} + \frac{1,2^4}{2 \cdot 3!} + \frac{1,2^5}{3^2 \cdot 3!} + \frac{1,2^6}{3^3 \cdot 3!} + \frac{1,2^7}{3^4 \cdot 3!} \right) - 1 = 0,29$$

$$p_7 = \frac{1,2^7}{3^4 \cdot 3!} = 0,29 = 0,0021$$

$$p_{\text{отк.}} = p_7 = 0,0021$$

$$q = 1 - 0,0021 = 0,9979$$

$$A = \lambda q = 0,4 \cdot 0,9979 \approx 0,4$$

$$\bar{k} = \frac{A}{\mu} = 0,4 \cdot 3 = 1,2$$

$$\frac{p}{h} = \frac{1,2}{3} = 0,4 = x$$

$$\bar{z} = \frac{\rho^{n+1} \cdot p_0}{n \cdot n!} \cdot \frac{1 - \left(\frac{p}{h}\right)^m (m-1 - m \cdot \frac{p}{h})}{(1 - \frac{p}{h})^2} =$$



$$= \frac{1,2^4 - 0,29}{3 \cdot 6} \cdot \frac{1 - 0,4^4 (4 + 1 - 4 \cdot 0,4)}{(1 - 0,4)^2} =$$

$$= 0,08$$

$$\bar{z} = \bar{k} + \bar{e} = 1,2 + 0,08 = 1,28$$

$$\bar{t}_{\text{отк}} = \frac{\bar{r}}{\lambda} = \frac{0,08}{0,4} = 0,2$$

$$\bar{t}_{\text{сис.}} = \frac{\bar{z}}{\lambda} = \frac{1,28}{0,4} = 3,2$$

Снять ограничение с длины очереди можно, т.к.  $\lambda = 0,4 < 1$

Характеристики системы будут:

$A \rightarrow \lambda$   $t_{\text{отк}}$  уменьш.

$\rho_{\text{отк}} \rightarrow 0$   $q \rightarrow 1$