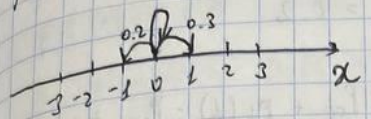
Домашняя работа

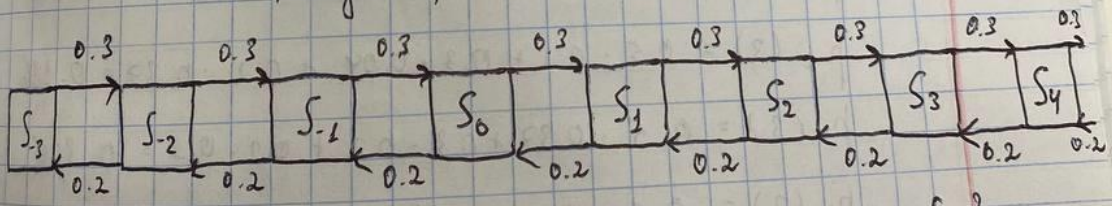
№1



S_i - m. в кошд. $i \in \mathbb{Z}$

$$(p_{ij}) = \begin{pmatrix} \ddots & 0 & 0.2 & 0.5 & 0.3 & 0 & 0 \\ & & & 0.2 & 0.5 & 0.3 & \\ & & & & 0.2 & 0.5 & 0.3 \\ & & & & & 0.2 & 0.3 \end{pmatrix}$$

$$(p_{ij}) = \begin{cases} 0.5, & j = i \\ 0.3, & j = i+1 \\ 0.2, & j = i-1 \\ 0, & j = i,\ i+1,\ i-1 \end{cases} \qquad i, j \in \mathbb{Z}$$



$k = 0$: $p_0(0) = 1$, $p_i(0) = 0 \quad \forall i \in \mathbb{Z} \setminus \{0\}$

$$\forall i \; p_i(k) = \sum_{j=-\infty}^{\infty} p_j(k-1)\, p_{ji} = \sum_{\substack{j=i \\ i+1 \\ i-1}} p_j(k-1)\, p_{ji}$$

$k = 1$: $p_0(1) = p_{00} = 0.5$

$p_1(1) = p_{01} = 0.3$

$p_{-1}(1) = p_{0-1} = 0.2$

$k = 2$: $p_0(2) = p_0(1) p_{00} + p_1(1) \cdot p_{10} + p_{-1}(1) \cdot p_{-10} =$

$= 0.37$

$p_1(2) = p_1(1) p_{11} + p_0(1) \cdot p_{01} = 0.5 \cdot 0.3 +$

$+ 0.3 \cdot 0.5 = 0.3$

$p_{-1}(2) = 0.5 \cdot 0.2 + 0.2 \cdot 0.5 = 0.2$

$p_2(2) = 0.3 \cdot 0.3 = 0.09$

$p_{-2}(2) = 0.2 \cdot 0.2 = 0.04$

$k = 3$:

$p_{-3}(3) = 0.2 \cdot 0.04 = 0.008$

$p_{-2}(3) = 0.5 \cdot 0.04 + 0.2 \cdot 0.2 = 0.06$

$p_{-1}(3) = 0.5 \cdot 0.2 + 0.3 \cdot 0.04 + 0.2 \cdot 0.37 = 0.186$

$p_0(3) = 0.5 \cdot 0.37 + 0.3 \cdot 0.2 + 0.2 \cdot 0.3 = 0.305$

$p_1(3) = 0.5 \cdot 0.3 + 0.3 \cdot 0.37 + 0.2 \cdot 0.09 = 0.279$

$p_2(3) = 0.5 \cdot 0.09 + 0.3 \cdot 0.3 = 0.135$

$p_3(3) = 0.3 \cdot 0.09 = 0.027$

$k = 4$:

$p_{-4}(4) = 0.2 \cdot 0.008 = 0,0016$

$p_{-3}(4) = 0.5 \cdot 0.008 + 0.2 \cdot 0.06 = 0.016$

$p_{-2}(4) = 0.5 \cdot 0.06 + 0.3 \cdot 0.008 + 0.2 \cdot 0.186 =$

$= 0.0696$

$p_{-1}(4) = 0.5 \cdot 0.186 + 0.3 \cdot 0.06 + 0.2 \cdot 0.305 = 0.172$

$p_0(4) = 0.5 \cdot 0.305 + 0.3 \cdot 0.186 + 0.2 \cdot 0.279 = 0.2641$

$p_1(4) = 0.5 \cdot 0.279 + 0.3 \cdot 0.305 + 0.2 \cdot 0.135 = 0.258$

$p_2(4) = 0.5 \cdot 0.135 + 0.3 \cdot 0.279 + 0.2 \cdot 0.027 = 0,1566$

$p_3(4) = 0.5 \cdot 0.027 + 0.3 \cdot 0.135 = 0.054$

$p_4(4) = 0.3 \cdot 0.027 = 0.0081$

$p_{-1}(4) + p_0(4) + p_1(4) = 0.172 + 0.2641 + 0.258 =$

$= 0.6941$

№2

$k = 1$: $p_{-1}(1) = 0.2$

$p_0(1) = 0.5$

$p_1(1) = 0.3$

$k = 2$: $p_{-1}(2) = 0.5 \cdot 0.2 + 0.2 \cdot 0.5 = 0.2$

$p_0(2) = 0.5 \cdot 0.5 + 0.3 \cdot 0.2 + 0.2 \cdot 0.3 =$

$= 0.37$

$p_1(2) = 0.5 \cdot 0.3 + 0.3 \cdot 0.5 =$

$= 0.3$

$k = 3$:

$p_{-1}(3) = 0.5 \cdot 0.2 + 0.2 \cdot 0.37 = 0.174$

$p_0(3) = 0.5 \cdot 0.37 + 0.3 \cdot 0.2 + 0.2 \cdot 0.3 = 0.305$

$p_1(3) = 0.5 \cdot 0.3 + 0.3 \cdot 0.37 = 0.261$

$k = 4$:

$p_{-1}(4) = 0.5 \cdot 0.174 + 0.2 \cdot 0.305 = 0.148$

$p_0(4) = 0.5 \cdot 0.305 + 0.3 \cdot 0.174 + 0.2 \cdot 0.261 = 0.2569$

$p_1(4) = 0.5 \cdot 0.261 + 0.3 \cdot 0.305 = 0.222$

$p_{-1}(4) + p_0(4) + p_1(4) = 0.148 + 0.2569 + 0.222 =$

$= 0.6269$