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Grupa: 234

Tema Lab 5-6

1. a) $X: \begin{pmatrix} 2 & 3 \\ 1/5 & 4/5 \end{pmatrix}$, $Y: \begin{pmatrix} -3 & -2 \\ 4/5 & 1/5 \end{pmatrix}$

$3X = \begin{pmatrix} 6 & 9 \\ 1/5 & 4/5 \end{pmatrix}$ $\quad X^{-1} = \begin{pmatrix} 1/2 & 1/3 \\ 1/5 & 4/5 \end{pmatrix}$

$\cos(\pi/2 \cdot X) = \begin{pmatrix} -1 & 0 \\ 1/5 & 4/5 \end{pmatrix}$

$Y^2 = \begin{pmatrix} 9 & 4 \\ 4/5 & 1/5 \end{pmatrix}$ $\quad Y + 3 = \begin{pmatrix} 0 & 1 \\ 4/5 & 1/5 \end{pmatrix}$

2. a) $2X + 3Y = \begin{pmatrix} 4 & 6 \\ 1/5 & 4/5 \end{pmatrix} + \begin{pmatrix} -9 & -6 \\ 4/5 & 1/5 \end{pmatrix} =$

$= \begin{pmatrix} 4-9 & 4-6 & 6-9 & 6-6 \\ 1/5 \cdot 4/5 & 1/5 \cdot 1/5 & 4/5 \cdot 4/5 & 4/5 \cdot 1/5 \end{pmatrix} =$

$= \begin{pmatrix} -5 & -2 & -3 & 0 \\ 4/25 & 1/25 & 16/25 & 4/25 \end{pmatrix}$

$3X - Y = \begin{pmatrix} 6 & 9 \\ 1/5 & 4/5 \end{pmatrix} - \begin{pmatrix} -3 & -2 \\ 4/5 & 1/5 \end{pmatrix} =$

$= \begin{pmatrix} 6+3 & 6+2 & 9+3 & 9+2 \\ 1/5 \cdot 4/5 & 1/5 \cdot 1/5 & 4/5 \cdot 4/5 & 4/5 \cdot 1/5 \end{pmatrix}$

$= \begin{pmatrix} 9 & 8 & 12 & 11 \\ 4/25 & 1/25 & 16/25 & 4/25 \end{pmatrix}$

~~$X^2 \cdot Y^3 = \begin{pmatrix} 4 & 9 \\ 1/5 & 4/5 \end{pmatrix} \cdot \begin{pmatrix} 9 & 4 \\ 4/5 & 1/5 \end{pmatrix} =$~~

$X^2 \cdot Y^3 = \begin{pmatrix} 4 & 9 \\ 1/5 & 4/5 \end{pmatrix} \cdot \begin{pmatrix} -27 & -8 \\ 4/5 & 1/5 \end{pmatrix} = \begin{pmatrix} 4 \cdot (-27) & 4(-8) & 9(-27) & 9(-8) \\ 1/5 \cdot 4/5 & 1/5 \cdot 1/5 & 4/5 \cdot 4/5 & 4/5 \cdot 1/5 \end{pmatrix}$

$= \begin{pmatrix} -108 & -32 & -243 & -72 \\ 4/25 & 1/25 & 16/25 & 4/25 \end{pmatrix}$

3. a) Determinați parametrii reali p și q știind că:

$X: \begin{pmatrix} 1 & 2 \\ p & q \end{pmatrix}$ $Y: \begin{pmatrix} 3 & 9 \\ 0.1 & \frac{p^2+0.02}{2} \end{pmatrix}$ sunt V.a. bine definite. ①

① $\Rightarrow p+q = 0.1 + \frac{p^2+0.02}{2} = 1$

$p, q, 0.1, \frac{p^2+0.02}{2} > 0$

$\Rightarrow q = 1-p$

$p^2 + 0.2 + 0.02 = 1$

$\Rightarrow p^2 = 1 - 0.22 = 0.78 \Rightarrow p = \pm\sqrt{0.78}$

$p > 0 \Rightarrow p = \sqrt{0.78}$

$q = 1 - \sqrt{0.78}$

4. a) $X: \begin{pmatrix} 2 & 3 \\ 1/5 & 4/5 \end{pmatrix}$, $Y: \begin{pmatrix} -3 & -2 \\ 4/5 & 1/5 \end{pmatrix}$, $2X+3Y = \begin{pmatrix} -5 & -2 & -3 & 0 \\ 4/25 & 1/25 & 16/25 & 4/25 \end{pmatrix}$ (din 2.a)

$\mathbb{P}(2X+3Y > 1) = 0$. (Toate sunt negative)

$\mathbb{P}(2X+3Y > 1 \mid X > 0) = 0$ (——— 4 ———)

$\mathbb{P}(2X+3Y < 3 \mid Y < -2) = \frac{\mathbb{P}(2X+3Y < 3 \wedge Y < -2)}{\mathbb{P}(Y < -2)} = \frac{4/5}{4/5} = 1$

$X^2 \cdot Y^3 = \begin{pmatrix} -108 & -32 & -243 & -72 \\ 4/25 & 1/25 & 16/25 & 4/25 \end{pmatrix}$ (din 2a)

$\mathbb{P}(X^2 \cdot Y^3 > 3) = 0$ (Toate sunt negative)

$\mathbb{P}(X^2 \cdot Y^3 \leq 3) = \frac{4+1+16+4}{25} = 1$

$\mathbb{P}(2X+3Y < 3X-Y) = \frac{4+1+16+4}{25} = 1$

$3X - Y =_{(\text{din } 2a)} \begin{pmatrix} 9 & 8 & 12 & 11 \\ 4/25 & 1/25 & 16/25 & 4/25 \end{pmatrix}$