

- 1) Two players **A** and **B** roll the pair of ordinary dice in turn. Player **A** rolls first. To win, a player must show a sum of dots on the two dice equal to two. Game is going on until somebody wins. Compute the probability for the first player **A** to win. *(3 points)*

2) Compute the product of two matrix:

$$\begin{pmatrix} 2 & 1 & 5 \\ 0 & 0 & -1 \end{pmatrix} \times \begin{pmatrix} 7 & -9 & 3 \\ -7 & 8 & -2 \\ -1 & 2 & -1 \end{pmatrix}.$$

*(2 points)*

3) Random variable  $\xi$  has the following probability density function:

$$p(x) = \begin{cases} 0, & x < 2\pi, \\ b \cdot \sin x, & 2\pi \leq x \leq 3\pi, \\ 0, & 3\pi < x. \end{cases}$$

Determine:

- a) Coefficient  $b$ , (1 point)
- b) Distribution Function  $F_{\xi}(x)$ ; (1 point)
- c) Mathematical Expectation  $M\xi$ , (2 points)
- d) Variance  $D\xi$ ; (2 points)
- e) Mode  $Mo\xi$ ; (2 points)
- f) Median  $Md\xi$ . (2 points)



4) Find an inverse matrix to the given:

$$A = \begin{pmatrix} 3 & 3 & 6 \\ 5 & 4 & 7 \\ 4 & 5 & 8 \end{pmatrix}$$

(2 points)

- 5) Compute the angle between direction of maximal increase of the function  $f(x_1, x_2, x_3) = \frac{x_2}{x_3} \ln x_1$  at the point  $(e, 2, 1)$  and the given vector  $\vec{a} = (e, 2, 2)$ . (4 points)

6) Solve the given Cauchy problem:

$$\begin{cases} 2y'' + 5y' + 2y = 6 \\ y(0) = 6, \quad y'(0) = 0 \end{cases}$$

(4 points)