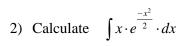
1) Find the equation of the tangent line and normal line to the given curve

## $y = x \cdot \ln x$ at the point $x_0 = 1$ .

(2 points)



(1 point)

	2 <i>a</i> ,	$0 \le x < 1,$
3) Random variable $\xi$ has the following probability density function: $P(x) = \begin{cases} \\ \\ \\ \\ \\ \end{cases}$	а,	$1 \le x \le 2, .$
	0,	$x \not \in [0,2].$

Calculate:

a) coefficient a, and distribution function $F_{\varepsilon}(x)$ ;	(1 <i>point</i> )
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- b) mathematical expectation  $M\xi$ , (1 point)
- c) variance  $D\xi$ ; (1 point)
- d) probability that random variable  $\xi$  will become greater than  $\frac{5}{6}$ . (1 *point*)

4) Find the solution of the given matrix equation:

$$\begin{pmatrix} 1 & -1 \\ 3 & 4 \end{pmatrix} \cdot X = \begin{pmatrix} 3 & 5 \\ 2 & 4 \end{pmatrix}.$$

(2 points)

5) Two players **A** and **B** roll the pair of ordinary dice in turn. Player **A** rolls first. To win, a player must sow a sum of dots on the two dice equal to four. Game is going on until somebody wins. Compute the probability for the second player **B** to win. (2 *points*)

6) For the given function  $u = 3x^{\frac{2}{3}}y^{\frac{1}{3}}$  compute the gradient at point M = (1;1) and the directional derivative of the function at M(1;1) in the direction of the calculated gradient. (3 *points*)

7) Compute the equations of asymptotes for the graph of the function:

$$y = \frac{x^2}{\sqrt{x^2 + 2}}$$
 (2 points)

8) For each of the following points x = -2; y = -1 and x = 1; y = 2 determine whether it is local max point, local min point or neither for the given function:

$$z = x^3 + 3xy^2 - 15x - 12y.$$
 (4 points)

9) Mega Memory Devices, a firm that assembles memory boards for personal computers, buys 60% of its memory chips from supplier A and the remainder from supplier B. Supplier A produces memory chips that are 5% defective, and B produces 10% defective. A memory chip is selected at random from the inventory. A test of the chip shows that it is defective. What is the probability that the chip was supplied by B?
(2 points)

10) Find the general solution of the following differential equations:

a)	y'' - y' - 2y = 0	(1 <i>point</i> )
b)	$y'' - y' - 2y = e^x$	(2 point)
c)	$y'' - y' - 2y = 4e^{-x}$	(2 poins)

11) Solve the given initial value problem:

$$\begin{cases} y' = \frac{y}{x} + \cos\frac{y}{x} \\ y(1) = 0 \end{cases}$$

(3 points)