**Probability and statistics GunelHasanova**

**Quiz 1**

**Problem 1.** Two dice are tossed.Find the probability of sum of fallen digit numbers are odd.

**Problem 2.** There are seven men and six women work in the company. Boss randomly selected seven workers for the new project. What is the probability of selected 3 workers are women.

**Problem 3.** There are 13 red and 7 blue buttons in the box. Two buttons are removed randomly. What is the probability of removed buttons are in the same color?

**Problem 4.** There are seven yellow and nine green balls in the box. Randomly four balls are removed. What is the probability of three of them are yellow.

**Problem 5.** There are nine details in the box, which three of them are red and rest of them are blue. Randomly removed three balls. What is the probability of removed two balls are red or one of them are blue?

**Problem 6.** Three teachers take an exam in a group of 24 people, the first selects 9 students, the second - 6, and the third - 9 students (student choice is made randomly from the list). The chances of that students to pass the examination at the first teacher is equal to 30%, at the second - only 40%, and at the third - 30% too. Find the probability that randomly one selected student will pass the exam.

**Problem 7.** There are six automatic calculator and five half-automatic calculator in the laboratory. The probability of don’t out of order the automatic calculator is equal to 0,85 and for the half automatic calculator is equal to 0,7. Randomly selected one calculator. Find the probability of out of order this selected calculator.

**Problem 8.** There are eight rifles in the police academy. Three of them are shooting-mark optical. The probability of shooting the mark by the rifleman with shooting-mark optical rifle's is equal to 0,75 and shooting the mark with non shooting-mark rifle's is equal to 0,6. The rifleman selected one rifle at random. What is the probability of rifleman shoots the mark in first shoot.

**Problem 9.** There are 16 details from the first factory, 24 details from the second factory and 14 details from the third factory in the box. The probability of produce excellent kind of detail first, second and third factory are respectively are equal to 0,8 , 0,5, 0,7. Randomly selected one detail. What is the probability of selected excellent kind of detail is from second factory.

**Problem 10.** There is gas station near the road. The rate of outgrow lorry and car equal to 5:3 in this road. The probability of the lorry take an oil from the gas station is equal to 0,2 and the probability of the car take an oil is equal to 0,3. One automobil enter to gas station for to take oil. What is the probability of that automobil is lorry.

**Problem 11**. There are 12 red and 6 blue buttons in the box. Removed two buttons at random. What is the probability that the buttons will be the same color?

**Problem 12**. There are 16 books in the shelf. 6 of them are covered. Removed three of them randomly. What is the probability of at least one book is covered.

**Problem 13.**There are six books in the library, which three of them are covered. The librarian take two books randomly. Find the probability that this selected books are covered.

**Problem 14.** The set of *A* and *B* are compartable sets. *n(A)=12, n(B)=13* and intersuction for the sets is equal to .Find the .

**Problem 15.**There are 18 copybooks in the shop. 11 of copybooks are for kids, rest of them are for adults. The saler sells 3 copybooks randomly. What is the probability of 2 selling copybooks are for kids or selling 1 copybooks are for adults.

**Problem 16.** Three dice are tossed. Find the probability that three fallen digit number are exactly same.

**Problem 17.** In how many ways can a group of 32 students be divided into three groups with 9, 11, and 12 people in each group?

**Problem 18 .** Dice is thrown 6 times. What is the probability of "five" falls exactly 2 times.

**Problem 19.** Coin tossed four times. What is the probability of head falls three times.

**Problem 20.**Probability of successful results in a complex chemical experiment is 1/8. Find the most probable number of successful experiments if their total number is 20.

**Problem 21*.*** In the group there are 28 students. You must select a monitor, the deputy monitor and the trade union organizer. How many ways are there for this choice?

***Problem 22.*** The probability of occurrence event A is equal to 0,2.What is the probability of the event A occurs 70 times in 243 trials.

***Problem 23.*** The probability of event is equal to 0,6.The trials repeated 100 times. What is the probability of the event occurs at least 75 times and at most 90 times.

***Problem 24.*** It is known that the percentage of defect for some details is equal to 0,2.Controller checks 1000 details. What is the probability of to discover exactly 3 defective details?

***Problem 25.*** The probability of event is equal to 0,6.The trials repeated 100 times. What is the probability of the event occurs less than 75.

***Problem 26.*** Let X discrete random variable has the following distribution law:

|  |  |  |  |
| --- | --- | --- | --- |
| X | 1 | 0 | -2 |
| P | 1/4 | 1/4 | ½ |

Calculate the expectation , dispersion  and the standard deviation.

***Problem 27.*** The discrete random variable is given by .Calculate the expectation , dispersion  and the standard deviation.

***Problem 28.*** The probability of occurrence of event A is equal to 0,3. The independent trials occurs five times. Calculate the expectation , dispersion  and the standard deviation of X discrete random variables.

**Problem 29.**There are 10 elements in device. During the time of T the probability of out of order the element is equal to 0,04.Using the Chebyshev inequality calculate the probability of during the time of T the subtraction of the number of out of order elements X and expectation are less than two.

**Problem 30.**The probability of occurrence of event A is equal to 1/4 . 100 trials performed. Inequality for the X is 40<X<60. Using the Chebyshev inequality evaluate the occurrence of A in 40<X<60 interval.

**Problem 31.** The distribution of X discrete random variables are equal to

|  |  |  |
| --- | --- | --- |
| X | 0,5 | 0,7 |
| p | 0,2 | 0,8 |

Using the Chebyshev inequality evaluate the occurrence of  event.

**Problem 32.** The distribution function of X continuous random variable is



What is the probability of X continuous random variable in (-1;1) interval.

**Problem 33.** The density function of X continuous random variable is , , in out of interval . What is the probability of X continuous random variable in  interval.

**Problem 34.**The density function of X continuous random variable is , , in out of interval .Calculate the constant parameter *c.*

**Problem 35.** The density function of X continuous random variable is ,  , in out of interval .Calculate the expectation of X continuous random variable*.*

**Problem 36.** The distribution function of X continuous random variable is



Calculate the expectation of X continuous random variable.

**Problem 37.** The density function of X continuous random variable is ,  , in out of interval .Calculate the expectation of  function*.*

**Problem 38**. The density function of uniform distribution is ,, in out of interval .Find the  distribution function for uniformly distribution.

**Problem 39**. The density function of uniform distribution is ,, in out of interval .Find the formula of expectation for uniformly distribution.

**Problem 40**. Find the expectation, dispersion and standard deviation of a X continuous random variable of uniformly distribution in interval (3,8).

**Problem 41**.The expectation of normal distribution is equal *a=5,* standard deviation is equal .Represent the formula of density function and distribution function of normal distribution.

**Problem 42**.The expectation and standard deviation are equal 12 and 4 appropriately in normal distribution. Assessment the probability of the X continuous random variable in *(16,18)* interval*.*

**Problem 43**.The density function of exponential distribution is equal , .( *f(x)=0, x<0 )*.Calculate the probability of X continuous random variable in *(1,2)* interval*.*

**Problem 44**.The distribution function of exponential distribution is equal , .( F*(x)=0, x<0 )*.Calculate the probability of *X*  continuous random variable in *(2,5)* interval*.*

**Problem 45**.The density function of exponential distribution is equal ,. Calculate the expectation, dispersion and standard deviation of X continuous random variable.

**Problem 46**.The distribution function of exponential distribution is equal , .( F*(x)=0, x<0 )*. Calculate the expectation, dispersion and standard deviation of X continuous random variable.

**Problem 47.** The density function of X continuous random variable is ,  , in out of interval . Calculate the dispersion of X continuous random variable.

**Problem 48.** The distribution function of X continuous random variable is



Calculate the dispersion of X continuous random variable.

**Problem 49.** The density function of X continuous random variable is ,  , in out of interval . Calculate the dispersion of X continuous random variable.

**Problem 50.** The density function of X continuous random variable is ,  , in out of interval .Calculate the expectation of  function*.*

**Problem 51**.The distribution law of discrete random variable X is below.

|  |  |  |  |
| --- | --- | --- | --- |
| X | -1 | 2 | 5 |
| p | 0,4 | 0,1 | 0,5 |

Find the one random variable of *Y=3X.*

**Problem 52**. *f(x)* is a density function of X random variable in interval *(a,b)*. Find the density function of *Y=2X* random variable.

**Problem 53**. is a density function of X random variable. Find the density function of *Y=X3+4* random variable.

**Problem 54**. The X random variable is distribute in interval with law of uniformly distribution. Find the *g(y)* density function of *Y=sinX* onerandom variable.

**Problem 55.**The distribution law of X and Y incompatible discrete random variable is below:

|  |  |  |
| --- | --- | --- |
| X | 1 | 3 |
| P | 0,5 | 0,5 |

|  |  |  |
| --- | --- | --- |
| Y | 2 | 4 |
| P | 0,3 | 0,7 |

What is the law of distribution of *Z=X+Y* random variable.

**Problem 56.**The density function of X and Y incompatible discrete random variable is below:

,(,  ,(

Find the density function of *Z=X+Y* random variable.

**Problem 57.**The distribution of two dimensional discrete random variables is below:

|  |  |  |  |
| --- | --- | --- | --- |
| Y | X | | |
| 5 | 7 | 9 |
| 4 | 0,17 | 0,13 | 0,25 |
| 5 | 0,10 | 0,30 | 0,05 |

Find the distribution of X and Y components.

**Problem 58.**The distribution function of two dimensional random variables is below:



Find the probability one of *(X,Y)* random points falls in a rectangle which limited by *x=0, x=*, *y=*,*y=* points.

**Problem 59.**The distribution function of two dimensional random variable is below:



Find the two dimensional density function of this system.

**Problem 60.**The distribution of selective frequency is like that:



|  |  |  |  |
| --- | --- | --- | --- |
| *xi* | 3 | 4 | 7 |
| *ni* | 1 | 3 | 6 |

Find the mean for this distribution.

**Problem 61.**The selection is conducted from the common collection. The volume is *n=10:*

|  |
| --- |
|  |
| *xi* | *1250* | *1270* | *1280* |
| *ni* | *3* | *5* | *2* |

Find the mean for this distribution selection using conventional variant.

**Problem 62.**The selection is conducted with this distribution selection. The volume is *n=10:*

|  |
| --- |
|  |
| *xi* | *-5* | *1* | *3* |
| *ni* | *4* | *3* | *3* |

Find the variance  .

**Problem 63.**The selection is conducted from the common collection.The volume is *n=10:*

|  |  |  |  |
| --- | --- | --- | --- |
| *xi* | 0,01 | 0,04 | 0,08 |
| *ni* | 4 | 2 | 4 |

Find the variance for this distribution selection using conventional variant.

**Problem 64.**The selection is conducted from the common collection. The volume is *n=10:*

|  |  |  |  |
| --- | --- | --- | --- |
| *xi* | 0,01 | 0,05 | 0,09 |
| *ni* | 7 | 1 | 2 |

Find the variance for this distribution selection using conventional variant.

**Problem 65. X** random variables distributed with law of Poisson .The volume of this distribution is equal to *n=1000.*Find unknown parameter of Poisson distribution.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| *xi* | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| *ni* | 400 | 371 | 175 | 40 | 8 | 4 | 2 |

**Problem 66.** X continuous random variables distributed with law of exponential distributions .The volume of this distribution law is equal to *n=200*. Find unknown parameter of exponential distribution.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| *xi* | 2,5 | 7,5 | 12,5 | 17,5 | 22,5 | 27,5 |  |
| *ni* | 135 | 43 | 15 | 4 | 2 | 1 |  |

**Problem 67.** X continuous random variables distributed with law of normal distributions .The volume of this distribution law is equal to *n=200*. Find unknown parameter ,of normal distribution.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| *xi* | 2 | 7 | 12 | 17 | 22 | 27 |  |
| *ni* | 130 | 48 | 15 | 4 | 2 | 1 |  |

**Problem 68.** X continuous random variables distributed with law of uniformly distribution .The volume of this distribution law is equal to *n=10*. Find unknown parameter ,of uniformly distribution.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *xi* | 3 | 5 | 7 | 9 | 11 |  |  |  |  |  |
| *ni* | 1 | 2 | 3 | 1 | 3 |  |  |  |  |  |

**Problem 69.** The standard deviation of the common selection is equal to , the mean and the volume of this selection is equal to *n*=25 , *t=1,96* according to Laplas function*.*Find the interval of reputation of this common selection.

**Problem 70**.The distribution law of discrete random variable X is below.

|  |  |  |  |
| --- | --- | --- | --- |
| X | 7 | 5 | 7 |
| p | 0,3 | 0,2 | 0,8 |

Find the one random variable of *Y=4X+3.*

**Problem 71**. *f(x)* is a density function of X random variable in interval *(a,b)*. Find the density function of *Y=4X+7* random variable.

**Problem 72**. is a density function of X random variable. Find the density function of *Y=X2+5* random variable.

**Problem 73**. The X random variable is distribute in interval with law of uniformly distribution. Find the *g(y)* density function of *Y=cosX* onerandom variable.

**Problem 74.**The distribution law of X and Y incompatible discrete random variable is below:

|  |  |  |
| --- | --- | --- |
| X | 1 | 3 |
| P | 0,7 | 0,3 |

|  |  |  |
| --- | --- | --- |
| Y | 2 | 4 |
| P | 0,3 | 0,2 |

What is the law of distribution of *Z=X+Y* random variable.

**Problem 75.**The density function of X and Y incompatible discrete random variable is below:

,(,  ,(

Find the density function of *Z=X+Y* random variable.