Started on	Friday, 3 December 2021, 6:50 AM
State	Finished
Completed on	Friday, 3 December 2021, 8:38 AM
Time taken	1 hour 47 mins
Marks	21.00/25.00
Grade	8.40 out of 10.00 (84 %)

Incorrect

Mark 0.00 out of 1.00

Let the random variable X have a discrete *uniform distribution* on the set of integers {3, 6, 9, 12, 15, 18, 21}. Find the *mean* and *variance* of X.

- \bigcirc a. E(X) = 2, V(X) = 6
- \bigcirc b. E(X) = 4, V(X) = 4
- o. E(X) = 12, V(X) = 36
- od. E(X) = 12, V(X) = 12
- e. None of others

×

If $X \sim Unif()$ and values are in $\{a, a+1, ..., b\}$, then

- The *mean* of X is $\mu = E(X) = \frac{a+b}{2}$
- The *variance* of X is $\sigma^2 = V(X) = \frac{(b-a+1)^2-1}{12}$

Given a discrete *uniform distribution* X whose values are integers in {3, 6, 9, 12, 15, 18, 21}.

Let Y = X/3, then Y has a discrete *uniform distribution* on the set of integers {1, 2, 3, 4, 5, 6, 7}.

$$E(Y) = (1+7)/2 = 4 \Rightarrow E(X) = 3E(Y) = 12.$$

$$V(Y) = [(7 - 1 + 1)^2 - 1]/12 = 4 => V(X) = 36.$$

The correct answer is: E(X) = 12, V(X) = 36

Question 2
Incorrect
Mark 0.00 out of 1.00

Consider a sequence of independent Bernoulli trials with p = 0.4. After the seventh success occurs, what is the expected number of trials to obtain the eighth success?

- a. None of the others
- o b. 4
- oc. 3
- d. 20
- e. 2.5

<u>1</u> = -

= = 2 = x

Lack of Memory Property of Geometric distribution

After the sixth success, the expected number of trials to obtain the eighth success = The expected number of trials to obtain the first success = E(X) = 1/p = 1/0.4 = 2.5

Question 3
Correct
Mark 1.00 out of 1.00
Let <= be "less than or equal". Let the random variable X have a discrete uniform distribution on the intergers 1<=x<=35. Determine the mean and variance of X.
○ a. 17 and 102

The correct answer is: 18 and 102

b. None of the others

c. 17.5 and 102d. 18 and 102

Incorrect

Mark 0.00 out of 1.00

A dangerous computer virus attacks a folder consisting of 50 files. Files are affected by the virus independently of one another. Each file is affected with the probability 0.02. What is the probability that more than 3 files are affected by this virus?

- a. 0.06
- b. None of the others
- c. 0.814
- d. 0.018
- e. 0.078

Let X be the number of files affected by the virus.

Then $X \sim Binom(n = 50, p = 0.02)$.

We wish to find P(X > 3).

 $P(X > 3) = 1 - P(X \le 3) = 0.018$

The correct answer is: 0.018

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Question 5	
Correct	
Mark 1.00 out of 1.00	
A store receives a shipment of 1000 phones. Suppose the probability that a phone is defective is 0.1%. Let X be the number of defective phones in the shipment.	
What kind of distribution does X have?	
○ a. Poisson	
○ b. Negative Binomial	
_ c. Geometric	
⊚ d. Binomial	~
○ e. Hypergeometric	

The correct answer is: Binomial

estion 0
rrect
ark 1.00 out of 1.00
The probability that an individual is left-handed is 0.11. In a class of 40 students, what is the probability of finding five left-handers?
a. None of the other choices is correct
b. 0.179
c. 0.000
od. 0.125
o e. 0.11

Correct

Mark 1.00 out of 1.00

An array of 30 LED bulbs is used in an automotive light. The probability that a bulb is defective is 0.001 and defective bulbs occur independently.

Determine the probability that an automotive light has **no** defective bulb.

- a. 0.970
- o b. 0.030
- c. 1/30
- d. 0.029
- e. None of the others

Let X be the number of defective bulbs in an automotive light. Then $X\sim Binom(n=30, p=0.001)$. We wish to find P(X=0)=0.970

Correct

Mark 1.00 out of 1.00

Given the probability distribution of a discrete random variable X.

Х 3

4

7 0.4 9 0.3

P(X) 0.1 0.2

Find E(X) and V(X)

- a. 6.6, 5.9
- b. 5.9, 5.4
- c. None of these
- od. 6.6, 4.44
- e. 5.75, 4

Your answer is correct.

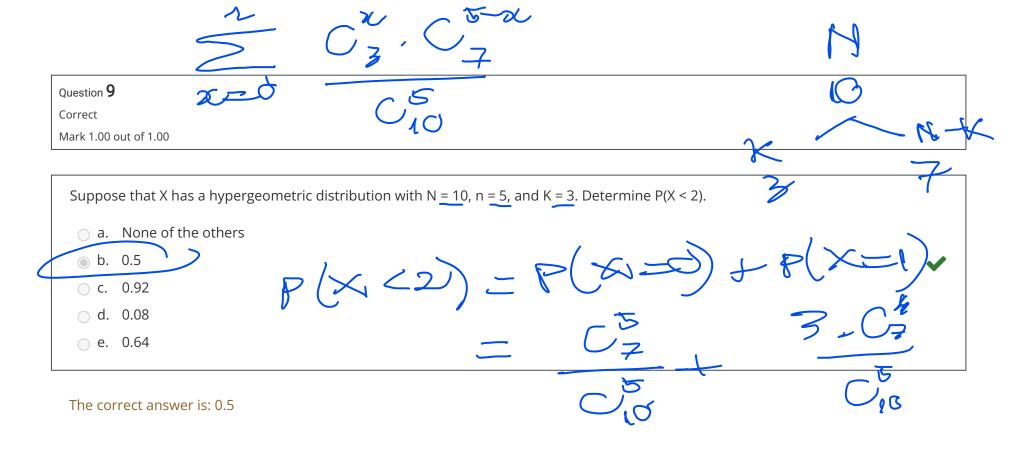
$$E(X) = 3*0.1 + 4*0.2 + 7*0.4 + 9*0.3 = 6.6$$

$$E(X^2) = 3^2*0.1 + 4^2*0.2 + 7^2*0.4 + 9^2*0.3 = 48$$

$$V(X) = E(X^2) - E(X)^2 = 48 - 6.6^2 = 4.44$$

The correct answer is:

6.6, 4.44



Correct

Mark 1.00 out of 1.00

Let the random variable X be a **Poisson distribution** with mean of 0.8. Find the probability that X > 1.

- a. 0.550
- b. 0.19↑
- c. 0.809
- d. 0.640
- o e. None of the other choices is correct



= 1 - = e = x)

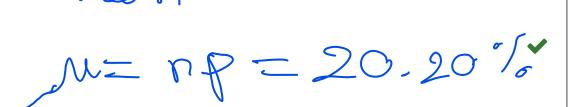
$$P(X>1) = 1-P(X \le 1) = 1-P(X = 0) - P(X = 1) = 0.191$$

Mark 1.00 out of 1.00

p-20% =

An exciting computer game is released. Twenty percent of players will buy an **advanced version** of the game. Among 20 users, what is the expected number of people who will buy the **advanced version**?

- a. 20
- b. 4
- oc. 5
- d. 10
- e. None of the others



Let X be the number of players who will buy the advanced version among 20 players.

Then X has a binomial distribution with parameter n = 20, p = 0.2

$$==> E(X) = np = 20*0.2 = 4$$

Correct

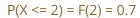
Mark 1.00 out of 1.00

Given the cumulative distribution function

$$F(x) = \begin{cases} 0 & x < 1 \\ 0.7 & 1 \le x < 4 \\ 0.9 & 4 \le x < 7 \\ 1 & 7 \le x \end{cases}$$

Find $P(X \le 2)$ and P(X > 4)

- a. 0.3, 0.1
- o b. 0.7, 0.9
- oc. None of the other choices is correct
- od. 0.3, 0.9
- e. 0.7, 0.1



$$P(X > 4) = 1 - P(X < + 4) = 1 - F(X) = 1 - 0.9 = 0.1$$

Ouestion	1	3
CUESHOIL	- 1	•

Correct

Mark 1.00 out of 1.00

Give $f(x)=0.75 \cdot 0.25^x$, x=0.1.2... is the probability mass function. Which the following statement is NOT TRUE?

- \bigcirc a. P(X = 2) = 3/64
- b. All of the others
- c. P(X ≥ 1) = 48/64
- \bigcirc d. P(X ≤ 2) = 63/64

The correct answer is: $P(X \ge 1) = 48/64$

Correct

Mark 1.00 out of 1.00

p = 0,1

Suppose the probability that item produced by a certain machine will be defective is 0.1. Find the probability that 20 items will contain at least one defective item. Assume that the quality of successive items is independent.

- a. 0.270
- o b. 0.122
- c. None of these
- d. 0.878 i
- e. 0.730

DC

P(X) = 1-P(XC) = 1-P(X=0=1-0

n=20

Let X be the number of defective items then X has binomial distribution with parameter n = 20, p = 0.1.

The desired probability is P(X > 0) = 1 - P(X = 0) = 0.878

Question 15	
Correct	
Mark 1.00 out of 1.00	

A multiple choice test contains 25 questions, each with four answers. Assume a student just guesses on each question. What is the probability that the student answers more than 22 questions correctly?

- a. 2.46558.10⁻¹²
- b. 1.15463x10⁻¹⁴
- c. None of these
- d. 0.096770

The correct answer is: 2.46558.10⁻¹²



Correct

Mark 1.00 out of 1.00

The number of 113-calls in HCM city, has a Poisson distribution with a mean of 7 calls per day. The probability that there are 4 calls tomorrow is ____

- a. None of the other choices is correct
- o b. 0.195
- o c. 0.091
- d. 0.060
- e. 0.149

Let X be the number of 113-calls in a day.

 $X \sim Poisson(lambda)$ and E(X) = lambda = 7 (= mean of 7 calls/day)

$$f(x) = \frac{e^{-\lambda} \lambda^{X}}{x!}$$

 $P(X = 8) = e^{-7}(7^4)/4! = 0.091$

Mark 1.00 out of 1.00

A computer user tries to recall her password. She knows it can be one of 6 possible passwords. She tries her passwords until she finds the right one.

Find the expected number of passwords she uses.

- a. 5 mlm
- o b. 3
- oc. 4
- d. 6
- e. None of the others



Let X be the number of passwords she uses until she finds the right one.

Then $X \sim Geometric(p = 1/6)$

$$E(X) = 1/p = 6.$$

Correct

Mark 1.00 out of 1.00

Consider the time to recharge the flash in a camera. The probability that a camera passes the test is 0.9, and the cameras perform independently. What is the probability that the second failure is obtained at the fifth test?

- a. 0.003
- b. None of the others
- c. 0.047
- d. 0.035
- e. 0.029



Let X be the number of tests until the second failure.

Then X has a negative binomial distribution with parameter p = 0.1 and r = 2.

We wish to find P(X = 5).

$$P(X=5) = {4 \choose 1} 0.1^2 (0.9)^3 = 0.029$$

Incorrect

Mark 0.00 out of 1.00

Network breakdowns are unexpected rare events that occur every 3 weeks, on the average. Compute the probability of more than one breakdown during a 12-week period.

- a. None of the others
- b. 0.908
- o c. 0.982
- d. 0.092
- e. 0.927

Let X be the number of network breakdowns during a 12-week period. Then X has a Poisson distribution with mean of 4 (breakdowns per 12 weeks).

×

We wish to find P(X > 1)

= 1 - P(X = 0) - P(X = 1) = 0.908

Correct

Mark 1.00 out of 1.00

Let X be a binomial random variable with p=0.1 and n=10. Calculate the following probability: P(X>2) and P(X`<=`8).

- a. 0.0702 and 0
- b. 0.702 and 0.999
- o. 0.702 and 1
- d. None of others.
- e. 0.9892 and 1







The correct answer is: None of others.



Mark 1.00 out of 1.00

Assume that each of your calls to a popular radio station has a probability of 0.04 of connecting, that is, of not obtaining a busy signal. Assume that your calls are independent.

What is the probability that your first call that connects is your 8th call?

- a. 0.020
- b. 0.040
- c. 0.025
- d. 0.030
- e. None of the others

Let X be the number of calls until the first connect. Then $X \sim \text{Geometric}(p=0.04)$. We wish to compute P(X=8).

 $P(X=8) = (0.96)^7*(0.04) = 0.030$

Correct

Mark 1.00 out of 1.00

You roll a fair die until it shows a six. What is the expected number of times of rolling?

- o a. 3
- ob. 4
- c. None of these
- d. 6
- e. 12

Your answer is correct.

Let X be the number of times of rolling until a six comes up. Then X~Geometric(p=1/6).

$$E(X) = 1/p = 6.$$

The correct answer is:

6

Correct

Mark 1.00 out of 1.00

Suppose that the random variable X has a geometric distribution with parameter p = 0.3. Find P(X > 2).

- a. 0.49
- o b. 0.21
- oc. None of the others
- d. 0.79
- e. 0.7

$$P(X > 2) = 1 - P(X = 1) - P(X = 2)$$

= 1 - 0.3 - 0.7*0.3 = 0.49

Question 24
Correct

Mark 1.00 out of 1.00

Messages arrive at a switchboard in a Poisson manner at an average rate of five per hour. Find the probability for each of the following event: "No message arrives within one hour"

- a. 0.4046
- b. None of the other choices is correct
- o. 0.0067
- d. 0.4406
- e. 0.4460

Correct

Mark 1.00 out of 1.00

Given the probability distribution of X.

X 0

1

2

Otherwise

P(X)

а

0.1

2a

0

0.3

Find E(X).

a. 1.8

b. None of the others

oc. 2

od. 1.5

e. 2.2

First, determine a such that a + 0.1 + 2a + 0.3 = 1.

$$==> a = 0.2$$

$$E(X) = 0*0.2 + 1*0.1 + 2*0.4 + 3*0.3 = 1.8$$