

**Started on** Wednesday, 28 September 2022, 10:06 PM  
**State** Finished  
**Completed on** Wednesday, 28 September 2022, 10:11 PM  
**Time taken** 5 mins 23 secs  
**Marks** 25.00/30.00  
**Grade** 8.33 out of 10.00 (83%)

## Question 1

Correct

Complimentary

Mark 1.00 out of 1.00

The number of e-mail messages received per hour has the following distribution:

$x = \text{number of messages}$	10	11	12	13	14	15
$f(x)$	0.08	0.15	0.30	0.20	0.20	0.07

The mean and variance of the received message?

- ☒ a.  $E(X)=12,5$ ;  $V(X)=1,85$   
☐ b.  $E(X)=12,5$ ;  $V(X)=18,5$   
☐ c.  $E(X)=10,5$ ;  $V(X)=1,85$   
☐ d.  $E(X)=18,5$ ;  $V(X)=1,25$   
☐ e. None of them



Your answer is correct.

The correct answer is:  
 $E(X)=12,5$ ;  $V(X)=1,85$

## Question 2

Correct

Mark 1.00 out of 1.00

Give  $f(x) = 0,75 \cdot 0,25^x$ ,  $x = 0, 1, 2, \dots$  is the probability mass function. Which the following statement is NOT TRUE?

- ☐ a. All of the others
- ☒ b.  $P(X \geq 1) = 48/64$
- ☐ c.  $P(X \leq 2) = 63/64$
- ☐ d.  $P(X = 2) = 3/64$
- ☐ e.  $P(X = 1) = 0.25$



Your answer is correct.

The correct answer is:

$$P(X \geq 1) = 48/64$$

## Question 3

Correct

Mark 1.00 out of 1.00

The following table contains the probability distribution for  $X$  = the number of traffic accidents reported in a day in Hanoi.

X	0	1	2	3	4	5
P(X)	0.10	0.20	0.45	0.15	0.05	0.05

The probability of more than 2 accidents is

- ☐ a. 0.3
- ☐ b. 0.45
- ☒ c. 0.25
- ☐ d. 0.7
- ☐ e. 0.75



Your answer is correct.

The correct answer is:  
0.25

## Question 4

Correct

Mark 1.00 out of 1.00

Determine the constant  $c$  so that the following function is a probability mass function:

$f(x) = cx$  for  $x = 1, 2, 3, 4$ .

- ☐ a.  $c=0,2$
- ☐ b.  $c=0,15$
- ☐ c.  $c=0,05$
- ☒ d.  $c=0,1$



Your answer is correct.

The correct answer is:  
 $c=0,1$

Question **5**

Correct

Mark 1.00 out of 1.00

Suppose the probability that item produced by a certain machine will be defective is 0.2.

Find the probability that 10 items will contain at most one defective item.

Assume that the quality of successive items is independent.

- ☐ a. 0.89263
- ☐ b. 0.27337
- ☐ c. 0.63125
- ☒ d. 0.37581
- ☐ e. None of them



Your answer is correct.

The correct answer is:  
0.37581

## Question 6

Correct

Mark 1.00 out of 1.00

Suppose that we have a box of marbles, 40% of which are blue. We reach in and draw five marbles from this box **with replacement**. In computing the probability of obtaining at most two blue marbles,

I. An exact answer is impossible to obtain.

II. Using a binomial distribution with success probability 40% will give the exact answer.

III. Using a binomial distribution will approximate the probability in question if the number of marbles in the box is relatively large.

- ☐ a. I and III only
- ☐ b. I, II and III
- ☒ c. II only
- ☐ d. I only
- ☐ e. III only



Your answer is correct.

The correct answer is:  
II only

## Question 7

Correct

Mark 1.00 out of 1.00

Suppose that we have a box of marbles, 40% of which are blue. We reach in and draw five marbles from this box **without replacement**. In computing the probability of obtaining at most two blue marbles,

I. An exact answer is impossible to obtain.

II. Using a binomial distribution with success probability 40% will give the exact answer.

III. Using a binomial distribution will approximate the probability in question if the number of marbles in the box is relatively large.

- ☐ a. I and II
- ☒ b. III only
- ☐ c. II only
- ☐ d. I only



Your answer is correct.

The correct answer is:  
III only

## Question 8

Correct

Mark 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 **at least** five left-handers?

- ☐ a. None of them
- ☒ b. 0.45321
- ☐ c. 0.3251
- ☐ d. 0.21442
- ☐ e. 0.1825



Your answer is correct.

The correct answer is:  
0.45321



## Question 9

Correct

Mark 1.00 out of 1.00

Suppose that we have a box of marbles, 40% of which are blue. We reach in and draw five marbles from this box **with replacement**. If we interested in the number of blue marbles taken out, which distribution can be applied to this random variable?

- ☐ a. Poisson
- ☒ b. Binomial
- ☐ c. Negative Binomial
- ☐ d. Geometric
- ☐ e. Hypergeometric



Your answer is correct.

The correct answer is:  
Binomial

Question **10**

Correct

Mark 1.00 out of 1.00

The random variable  $X$  has a binomial distribution with  $n = 10$  and  $p = 0.5$ .

What value of  $X$  is most likely?

- ☒ a. 5
- ☐ b. 6
- ☐ c. 2
- ☐ d. 3
- ☐ e. 4



Your answer is correct.

The correct answer is:

5

Question **11**

Correct

Mark 1.00 out of 1.00

Suppose  $X$  has a hypergeometric distribution with  $N=20$ ,  $n=4$ , and  $M=4$ . Find  $P(X=3)$  and  $P(X \leq 3)$ .

- ☐ a. 0.00021 and 0.99979
- ☐ b. 0.9866 and 0.0134
- ☐ c. None of the other choices is correct
- ☒ d. 0.0132 and 0.99979



Your answer is correct.

The correct answer is:  
0.0132 and 0.99979

Question **12**

Correct

Mark 1.00 out of 1.00

A batch contains 52 bacteria cells. Assume that 13 of cells are not good. Five cells are selected at random, without replacement. What is the probability that exactly 3 cells of selected cells are not good?

- ☐ a. 0.27428
- ☐ b. 0.25156
- ☐ c. 0.49524
- ☒ d. 0.08154
- ☐ e. None of them



Your answer is correct.

The correct answer is:  
0.08154

Question **13**

Correct

Mark 1.00 out of 1.00

The random variable  $X$  has a hypergeometric distribution with  $N = 40$ ,  $M=30$  and  $n = 5$ .

What value of  $X$  is most likely?

- ☐ a. 3
- ☒ b. 4
- ☐ c. 2
- ☐ d. 5



Your answer is correct.

The correct answer is:

4

Question **14**

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: "At least three messages arrive within one hour"

- ☐ a. None of the above
- ☒ b. 0.87535
- ☐ c. 0.1257
- ☐ d. 0.966
- ☐ e. 0.873



Your answer is correct.

The correct answer is:  
0.87535

Question **15**

Correct

Mark 1.00 out of 1.00

Suppose that average number of accidents occurring weekly on a particular stretch of a highway equals 4. Calculate the probability that there is at least 2 accident this week.

- ☐ a. 0.8920
- ☐ b. 0.3114
- ☒ c. 0.90842
- ☐ d. none of them
- ☐ e. 0.5902



Your answer is correct.

The correct answer is:  
0.90842

Question **16**

Correct

Mark 1.00 out of 1.00

The number of 113 calls in Hanoi, has a Poisson distribution with a mean of 10 calls a day. The probability of seven calls in a day is?

- ☐ a. 0.24
- ☐ b. 0.42
- ☐ c. None of them
- ☒ d. 0.09008
- ☐ e. 0.22



Your answer is correct.

The correct answer is:  
0.09008



Question **17**

Correct

Mark 1.00 out of 1.00

The probability of a successful optical alignment in the assembly of an optical data storage product is 0.8. Assume the trials are independent. What is the probability that the first successful alignment requires exactly 5 trials?

- ☐ a. 0.0064
- ☐ b. none of them
- ☒ c. 0.00128
- ☐ d. 0.1332
- ☐ e. 0.4332



Your answer is correct.

The correct answer is:  
0.00128

Question **18**

Correct

Mark 1.00 out of 1.00

Assume that each of your calls to a popular radio station has a probability of 0.02 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 10th call?

- ☐ a. 0.01702
- ☐ b. 0.01634
- ☒ c. 0.01667
- ☐ d. None of them



Your answer is correct.

The correct answer is:  
0.01667

Question **19**

Correct

Mark 1.00 out of 1.00

Assume that each of your calls to a popular radio station has a probability of 0.02 of connecting, that is, of not obtaining a busy signal. Assume that your calls are independent.

What is the probability that it requires more than five calls for you to connect?

- ☐ a. 0.94119
- ☐ b. 0.01845
- ☒ c. 0.90392
- ☐ d. 0.92237
- ☐ e. Other number



Your answer is correct.

The correct answer is:  
0.90392

Question **20**

Correct

Mark 1.00 out of 1.00

A player of a video game is confronted with a series of opponents and has an 80% probability of defeating each one. Success with any opponent is independent of previous encounters. Until defeated, the player continues to contest opponents. What is the probability that a player defeats at least two opponents in a game?

- ☐ a. 0.8
- ☐ b. 0.668
- ☐ c. None
- ☒ d. 0.64



Your answer is correct.

The correct answer is:  
0.64

Question **21**

Correct

Mark 1.00 out of 1.00

Let the random variable  $X$  have a discrete uniform distribution on the intergers  $0 < x < 100$ . Find the mean and variance of  $X$ .

- ☒ a. 50 and 816.6667
- ☐ b. None of them
- ☐ c. 50 and 850
- ☐ d. 49.5 and 850
- ☐ e. 50 and 861.6667



Your answer is correct.

The correct answer is:  
50 and 816.6667

Question **22**

Incorrect

Mark 0.00 out of 1.00

Thickness measurements of a coating process are made to the nearest hundredth of a millimeter. The thickness measurements are uniformly distributed with values 0.15, 0.16, 0.17, 0.18, and 0.19.

Determine the mean and variance of the coating thickness for this process.

- ☐ a.  $E(X)=0,17$  and  $V(X)=0,0002$
- ☒ b.  $E(X)=17$  and  $V(X)=2$
- ☐ c.  $E(X)=1,7$  and  $V(X)=0,0002$
- ☐ d.  $E(X)= 0,15$  and  $V(X)=0,224$



Your answer is incorrect.

The correct answer is:  
 $E(X)=0,17$  and  $V(X)=0,0002$

Question **23**

Incorrect

Mark 0.00 out of 1.00

The lengths of plate glass parts are measured to the nearest tenth of a millimeter. The lengths are uniformly distributed with values at every tenth of a millimeter starting at 590.0 and continuing through 590.9.

Determine the mean and variance of the lengths.

- ☐ a.  $E(X) = 590,5$  and  $V(X)=0,825$
- ☐ b.  $E(X) = 590,45$  and  $V(X)=0,0825$
- ☒ c.  $E(X) = 590,45$  and  $V(X)=8,25$
- ☐ d.  $E(X) = 590,5$  and  $V(X)=0,0825$



Your answer is incorrect.

The correct answer is:

$E(X) = 590,45$  and  $V(X)=0,0825$

Question **24**

Correct

Mark 1.00 out of 1.00

If  $X$  is discrete uniform distributed over the interval  $[0,10]$ . Compute the probability that  $2 < X < 9$ .

- ☒ a.  $6/11$
- ☐ b. none of them
- ☐ c.  $6/10$
- ☐ d.  $7/10$
- ☐ e.  $8/11$



Your answer is correct.

The correct answer is:  
 $6/11$



Question **25**

Correct

Mark 1.00 out of 1.00

Suppose that  $X$  is a negative binomial random variable with  $p = 0.2$  and  $r = 4$ . Determine  $P(X=20)$ .

- ☐ a. None of them
- ☐ b. 0.2578
- ☐ c. 0.2563
- ☒ d. 0.0436
- ☐ e. 0.322



Your answer is correct.

The correct answer is:  
0.0436

Question **26**

Correct

Mark 1.00 out of 1.00

In a clinical study, volunteers are tested for a gene that has been found to increase the risk for a disease. The probability that a person carries the gene is 0.1.

What is the probability that ten or more people need to be tested to detect three with the gene?

- ☐ a. 0.97875
- ☒ b. 0.94703
- ☐ c. 0.01722
- ☐ d. 0.0124



Your answer is correct.

The correct answer is:  
0.94703

Question **27**

Incorrect

Mark 0.00 out of 1.00

In a clinical study, volunteers are tested for a gene that has been found to increase the risk for a disease. The probability that a person carries the gene is 0.1.

What is the expected number of people to test to detect 10 people with the gene?

- ☐ a. 80
- ☐ b. 60
- ☒ c. 120
- ☐ d. 100



Your answer is incorrect.

The correct answer is:  
100

Question **28**

Incorrect

Mark 0.00 out of 1.00

Suppose that  $E(X)=30$  and  $V(X)=4$

Consider a new random variable  $Y$  is defined by  $Y=3x-10$

Compute the mean and variance of  $Y$ ?

- ☒ a.  $E(X)=80$  and  $V(X)=12$
- ☐ b.  $E(X)=90$  and  $V(X)=36$
- ☐ c.  $E(X)=80$  and  $V(X)=36$
- ☐ d.  $E(X)=90$  and  $V(X)=12$



Your answer is incorrect.

The correct answer is:

$E(X)=80$  and  $V(X)=36$

Question **29**

Correct

Mark 1.00 out of 1.00

Suppose that  $E(X)=10$  and  $V(X)=20$ .

Compute the mean value of  $X^2$  (or in other words,  $E(X^2)$ )?

- ☐ a. 80
- ☒ b. 120
- ☐ c. 90
- ☐ d. 140
- ☐ e. 150



Your answer is correct.

The correct answer is:  
120

Question **30**

Incorrect

Mark 0.00 out of 1.00

The random variable  $X$  has the following probability distribution:

$x$	2	3	5	8
Probability	0.2	0.4	0.3	0.1

Determine the value of C.D.F at 5 (that means  $F(5)=?$ )

- ☐ a. 0.6
- ☐ b. None of them
- ☒ c. 0.4
- ☐ d. 0.1
- ☐ e. 0.9



Your answer is incorrect.

The correct answer is:  
0.9

