Review

<u>Choose the correct answer from the following questions</u>

(1) ➔ **In a population, suppose 30% are in the event *A*, 50% in *B*, and 70% in *A* or *B*. Then, if one is randomly chosen form this population**

$P(A \cap B) =$	**(A) 0.1**	**(B) 0.3**	**(C) 0.5**	**(D) 0.7**	**(E) 0.8**
$P(A \cup B) =$	**(A) 0.1**	**(B) 0.3**	**(C) 0.5**	**(D) 0.7**	**(E) 0.8**
$P(A / B) =$	**(A) 0.1**	**(B) 0.3**	**(C) 0.5**	**(D) 0.2**	**(E) 0.8**
$P(A \cap B^c) =$	**(A) 0.2**	**(B) 0.3**	**(C) 0.5**	**(D) 0.7**	**(E) 0.8**

Knowing *B* has what effect on the probability of A?

(A) knowing B increases the probability of A. **(B) knowing B decreases the probability of A.**

(C) knowing B has no effect on the probability A. **(D) we can't say what the effect is.**

(2) ➔ **Suppose a certain population of children, 25% have allergies. If we choose 13 children and let** $X =$ **the number in 13 with allergies, then**

The possible value of X **are**

(A) $X = 0,1,2,\ldots,13$ **(B)** $X = 0,1,2,\ldots$ **(C)** $X = 1,2,\ldots,13$ **(D)** $X = 13$

$P(X = 5) =$

(A) $\binom{13}{5}(0.25)^5(0.75)^8$ **(B)** $\binom{13}{5}(25)^5(75)^8$ **(C)** $\binom{5}{13}(0.25)^{13}(0.75)^8$ **(D)** $\frac{e^{-13}13^5}{5!}$

$\mu = E(X) =$ **(A) 0.25** **(B) 3.25** **(C) 5.35** **(D) 9.75**

$\binom{13}{5} =$ **(A) 0.433** **(B) 1287** **(C) 1716** **(D) 5827**

(3) ➔ **Suppose we measure the distance from the nearest hospital (in km) for Saudis living in certain area of the country:**

46 35 52 68 70 49 53

The sample median is:

(A) 50.2 **(B) 53.29** **(C) 52** **(D) 60** **(E) 68** **(F) 69**

The sample mean is:

(A) 25 **(B) 53.29** **(C) 52** **(D) 57** **(E) 62.17** **(F) 68**

$\sum x_i^2$ **equals:**

(A) 18663 (B) 20779 (C) 31520 (D) 139129 (E) 221000

The unit of the variance is:

(A) S (B) s^2 (C) km (D) km^2 (E) no unit

If $n = 7$, $\overline{X} = 53$, **and** $\sum x_i^2 = 21000$ **, then the coefficient of variation equals:**

(A) 410.98 (B) 20.127 (C) 222.83 (D) 28.165 (E) 38.25

(4) ➔ **Suppose** X **the number neck injuries in 10 days at a certain hospital has a Poisson distribution with mean 3, then**

The possible values of X **are:**

(A) $X = 0,1,2,...,10$ **(B)** $X = 0,1,2,...$ **(C)** $X = 1,2,...,10$ **(D)** $X = 10$

$P(X = 4) =$ **(A) 0** **(B)** $\frac{e^{-3}3^4}{4!}$ **(C)** $\frac{e^{-3}3^4}{3!}$ **(D)** $\frac{e^{-3}4^3}{4!}$

$P(X \geq 4) =$ **(A) 0.1494 (B) 0.5975 (C) 0.9489 (D) 0.9502**

The expected number in 10 days is:

(A) 3 (B) 6 (C) 21 (D) 30

The expected number in 30 days is:

(A) 3 (B) 9 (C) 30 (D) 90

(5) ➔ **For a sample of women with a certain kidney complaint, we measure the serum uric acid in (**$\mu mol / l$**).**

Complete the following table for the sample

Serum Uric Acid	True Classes	Midpoints	Frequency	Relative Freq.	Cumulative Freq.
100 - 124			14		
		137	35		
	- 199.5		49		
			28		
		237	7		
		Total	175		

How many of the women had serum uric acid levels of 150 to 224?

(A) 68 (B) 91 (C) 119 (D) 126 (E) 154

What percent of women had a level of 200 or more?

(A) 20% **(B) 27%** **(C) 35%** **(D) 48%** **(E) 80%**

If a serum uric acid level for a woman is low if less than 149, what percent had low levels?

(A) 8% **(B) 20%** **(C) 28%** **(D) 42%** **(E) 72%**

Find the approximate value of the sample mean

(A) 29.2 **(B) 158.3** **(C) 171** **(D) 174.5** **(E) 186.4**

Find the approximate value of the sample variance

(A) 1050 **(B) 32.404** **(C) 1171** **(D) 50.245** **(E) 2186.4**

The coefficient of variation is equal to

(A) 0.1906 **(B) 5.246** **(C) 32.404** **(D) 171** **(E) 0**

(6) ➔ **If a discrete random variable X has probability distribution function given by:**

X	**0**	**1**	**2**	**3**
$P(X=x)$	**0.2**	**0.45**	**0.25**	**0.1**

Then,

$P(X \le 1) =$ **`(A) 0.2** **(B) 0.35** **(C) 0.45** **(D) 0.65**

$P(X \le 2) =$ **(A) 0.25** **(B) 0.7** **(C) 0.9** **(D) 1**

$P(1 < X \le 3) =$ **(A) 0.25** **(B) 0.35** **(C) 0.8** **(D) 0.9**

$\mu = E(X)$ **(A) 1** **(B) 1.25** **(C) 1.45** **(D) 5.45**

(7) ➔ **In a population of seven-years-old children, we measure X the number of adult teeth each has.**

If we randomly choose one child,

Fill in the following table

Number of teeth	**Population Frequency**	**Probability Distribution**	**Cumulative Distribution**
0	**90**		
1	**150**		
3	**210**		
4	**90**		
5	**60**		
6	**600**		

Label three of the columns in the above table with appropriate labels from among $P(X \le x)$, x, $P(X \ge x)$, and $P(X = x)$. One label will not used.

$P(X \ge 4) =$ **`(A) 0.15** **(B) 0.25** **(C) 0.4** **(D) 0.75**

$P(1 \le X < 3) =$ **(A) 0.25** **(B) 0.35** **(C) 0.8** **(D) 0.6**

The expected number of teeth: **(A) 2.65** **(B) 2.5** **(C) 2.8** **(D) 11.95**

(8) ➔ **If the variance of the sample** X_1, X_2, X_3 **is 3, then the variance of** $2X_1 - 1, 2X_2 - 1, 2X_3 - 1$ **is:**

(A) 15 **(B) 4** **(C) 12** **(D) 3.66**

(9) ➔ **If we measure "whether or not a person has had a measles vaccine", then the variable type is:**

(A) continuous **(B) discrete** **(D) qualitative** **(E) sample**

(10) ➔ **The mean is a measure which:**

(A) indicate the center of the values of the variable

(B) can be used to compare variation

(C) is larger as the values are more spread out

(D) has no units for continuous variable

(E) the value in the centre of the variable.

(11) ➔ **If we sample patients with a certain disease, and we measure the age (in years) and the hemoglobin level (in g/dl) obtaining:**

	Mean	Standard deviation
Age	49.8	3.0
Hemoglobin level	10.6	2.9

The variable with more variation in this sample is:

(A) age **(B) hemoglobin level** **(D) both about the same** **(E) we can't say**

(12) ➔ **A population of patients with arthritis is classified by the seriousness of the condition and the medication which the patient is now taking:**

		Medication Used				
		None (N)	Drug_1 (A)	Drug_2 (B)	Drug_3 (C)	Total
Arthritic Condition	Mild (M)	150	75	150	25	400
	Serious (S)	45	40	60	105	250
	Very Serious (V)	5	35	40	70	150
	Total	200	150	250	200	800

If we randomly choose one from the population, give:

In symbols, the event that the arthritic condition is not very serious and Drug_1 or Drug_2 is used.

In words, $S \cup A$

In words, S / A

$n(N^c)$	**(A) 150**	**(B) 200**	**(C) 350**	**(D) 400**	**(E) 600**
$n(V \cup C)$	**(A) 70**	**(B) 75**	**(C) 280**	**(D) 350**	**(E) 550**
$P(M \cup B)$	**(A) 0**	**(B) 0.188**	**(C) 0.625**	**(D) 0.813**	**(E) 150**
$P(S \cup V)$	**(A) 0**	**(B) 0.063**	**(C) 0.219**	**(D) 0.5**	**(E) 0.813**
$P(N \cap A)$	**(A) 0**	**(B) 0.156**	**(C) 0.281**	**(D) 0.5**	**(E) 0.75**
$P(N^c \cap V^c)$	**(A) 0**	**(B) 0.006**	**(C) 0.563**	**(D) 0.569**	**(E) 6.25**
$P[(A \cup B) \cap M]$	**(A) 0.15**	**(B) 0.219**	**(C) 0.281**	**(D) 0.719**	**(E) 1**
$P[(A \cup B) / M]$	**(A) 0.115**	**(B) 0.201**	**(C) 0.281**	**(D) 0.423**	**(E) 0.563**

Which arthritic condition has highest probability?

If it is known that the person is taking, drug_3, then which arthritic condition has the highest?

Given which medication used is the probability of a very serious arthritic condition highest?

(13) ➔ **A study is being made to estimate the proportion of people in a town who favor the construction of nuclear power plant. It was found that only 140 of 400 persons selected at random favor the project. Then for the 95% confidence interval for the proportion (**π**) of people in a town who favor the construction of nuclear power plant:**

The upper limit is

(A) 0.351 **(B) 0.359** **(C) 0.397** **(D) 0.389**

The lower limit is

(A) 0.349 **(B) 0.342** **(C) 0.303** **(D) 0.331**

(14) ➔ **Parameter usually have**

(A) many possible values. **(B) a value that is known or can be found**

(C) a value that is not known

(15) ➔ **Suppose that the discrete random variable *X* has the following probability function:**

f(–1)=0.05, f(0)=0.25, f(1)=0.25, f(2)=0.45, then:

P(X<1) equals to	**(A) 0.30**	**(B) 0.05**	**(C) 0.55**	**(D) 0.50**
P(X ≤ 1) equals to	**(A) 0.30**	**(B) 0.05**	**(C) 0.55**	**(D) 0.45**
The mean μ=E(X) equals	**(A) 1.1**	**(B) 0.0**	**(C) 1.2**	**(D) 0.50**
$E(X^2)$ equals to	**(A) 2.00**	**(B) 2.10**	**(C) 1.5**	**(D) 0.75**
The variance σ^2=Var(X) equals to:	**(A) 1.00**	**(B) 3.31**	**(C) 0.89**	**(D) 2.10**

(16) ➔ **If P(A)=0.9, P(B)=0.6, and P(A∩B)=0.5, then:**

$P(A\cap B^C)$ equals to	**(A) 0.40**	**(B) 0.10**	**(C) 0.50**	**(D) 0.30**
$P(A^C\cap B^C)$ equals to	**(A) 0.20**	**(B) 0.60**	**(C) 0.0**	**(D) 0.50**
P(B|A) equals to	**(A) 0.556**	**(B) 0.833**	**(C) 0.600**	**(D) 0.0**
The events A and B are	**(A) independent**	**(B) disjoint**	**(C) joint**	**(D) none**
The events A and B are	**(A) independent**	**(B) disjoint**	**(C) dependent**	**(D) none**

(17) ➔ **The length of life of electric bulbs is normally distributed with a mean 600 hours and standard deviation 16 hours. Then the probability that a bulb burns less than 620 hours is**

(A) 0.8944 (B) 0.1066 (C) 0.0885 (D) 0.8944

(18) ➔ **The average time takes to assemble a certain computer component is approximately normal having standard deviation 2.08. In an experiment a sample of 40 computers assembled. The average time of assembly was 12.73 minutes. For 98% confidence interval,**

The variance of the sample mean is

(A) 0.86 (B) 0.33 (C) 0.05 (D) 0.11

The upper limit for the 98% confidence interval is

(A) 12.85 (B) 14.32 (C) 13.41 (D) 13.50

The lower limit for the 98% confidence interval is

(A) 11.75 (B) 12.24 (C) 12.05 (D) 11.96

(19) ➔ **Which of the following is NOT CORRECT about a standard normal distribution?**

(A) P(0 < Z < 1.50) = .4332 **(B) P(Z < -1.0) = .1587**

(C) P(Z > 2.0) = .0228 **(D) P(Z > -2.5) = .4938**

(20) ➔ **If X is a continuous random variable has a mean $\mu = 16$ and a variance $\sigma = 5$, then P (X = 7) is equal to :**

(A) 0.0 **(B) 0.1** **(C) 0.2266** **(D) 0.25**

(21) ➔ **For (1-α)100% confidence interval for the mean μ . Then**

(A) The length of the confidence interval depends on μ

(B) The length of the confidence interval depends on $\overline{X}$

(C) μ lies on the center of the confidence interval.

(D) $\overline{X}$ lies on the center of the confidence interval.

(22) ➔ **For (1-α)100% confidence interval for the mean μ based on sample of size n from population having standard deviation σ. Then**

(A) The length of the confidence interval increases with the increase of sample size.

(B) The length of the confidence interval increases with the increase of the confidence (1-α)100%.

(C) The length of the confidence intervals increases with the increase of μ .

(D) The length of the confidence interval increases with the increase of $\overline{X}$.

(23) ➔ **A traffic control engineer reports that 75% of the cars passing through a check point are from Riyadh city. If at this check point, five cars are selected at random.**

The probability that none of them is from Riyadh city equals to :

(A) 0.2373 **(B) 0.9990** **(C) 0.00098** **(D) 0.7627**

The probability that four of them are from Riyadh city equals to :

(A) 0.0 **(B) 0.6045** **(C) 0.3955** **(D) 0.1249**

The probability that at least four of them are from Riyadh city equals to :

(A) 0.3627 **(B) 0.2763** **(C) 0.3955** **(D) 0.6328**

The expected number of cars that are from Riyadh city equals to :

(A) 1.00 **(B) 0.0** **(C) 3.00** **(D) 3.75**

(24) ➔ **The number of faults in a fiber optic cable follows a Poisson distribution with an average of 0.6 per 100 feet.**

The probability of 2 faults per 100 feet of such cable is:

(A) 0.3210 **(B) 0.9012** **(C) 0.0988** **(D) 0.50**

The probability of less than 2 faults per 100 feet of such cable is:

(A) 0.8781 (B) 0.9769 (C) 0.2351 (D) 0.8601

The probability of 4 faults per 200 feet of such cable is:

(A) 0.8024 (B) 0.1976 (C) 0.02602 (D) 0.9739

(25) ➔ **The average rainfall in a city for the month of March is 9.22 centimeters. Assuming a normal distribution with a standard deviation of 2.83 centimeters, then the probability that next March, this city will receive:**

less than 11.84 centimeters of rain is:

(A) 0.50 (B) 0.1762 (C) 0.8238 (D) 0.2018

more than 5 centimeters but less than 7 centimeters of rain is:

(A) 0.8504 (B) 0.34221 (C) 0.6502 (D) 0.1497

more than 13.8 centimeters of rain is:

(A) 0.3101 (B) 0.9726 (C) 0.0274 (D) 0.4053

(26) ➔ **Two engines operate independently, if the probability that an engine will start is 0.3, and the probability that other engine will start is 0.5, then the probability that both will start is:**

(A) 1.0 (B) 0.15 (C) 0.24 (D) 0.12

(27) ➔ **Assume that** $P(A) = 0.2$, $P(B) = 0.4$, $P(A \cap B \cap C) = 0.05$, **and** $P(\overline{A \cap B}) = 0.92$, **then:**

The event A and B are,

(A) independent (B) disjoint (C) dependent (D) none of this

Using question (2), $P(C | A \cap B)$ **is equal to,**

(A) 0.6040 (B) 0.625 (C) 0.054 (D) – 0.925

(29) ➔ **Suppose that the number of telephone calls received per day has a Poisson distribution with mean of 3 calls per day.**

The probability that 2 calls will be received in a given day is

(A) 0.546 (B) 0.646 (C) 0.149 (D) 0.224

The expected number of telephone calls received in a given week is

(A) 3 (B) 21 (C) 18 (D) 15

The probability that at least 2 calls will be received in a period of 12 hours is

(A) 0.594 (B) 0.191 (C) 0.809 (D) 0.442

(30) ➔ **A certain engineer is interested in the proportion of defective items in the population (π). In a random sample of 1000 items 250 are found to be defective.**

The point estimate for the true proportion of the defective items is :

(A) 250 (B) 1000 (C) 0.25 (D) 4

The upper bound of the 95% confidence interval estimate for the true proportion is:

(A) 0.226 (B) 0.277 (C) 0.295 (D) 0.567

The lower bound of the 95% confidence interval estimate for the true proportion is:

(A) 0.217 (B) 0.223 (C) 0.285 (D) 0.567

If the value of α decrease (get smaller), then the interval estimate will decrease (get smaller).

(A) Yes (B) No (C) No change

(31) ➔ **A man wants to paint his house in 3 colors. He can choose out of 6 colors. How many different color settings can he make?**

(A) 216 (B) 20 (C) 18 (D) 120

(32) ➔ **Let X be a random variable with the following probability distribution:**

X	- 3	6	9
$P(X = x)$	0.167	0.5	0.333

Then,

The expected value is equal

(A) 0.4 (B) 5.5 (C) 6.5 (D) 6.0

The value $E(X^2)$ is equal to:

(A) 30.25 (B) 36.0 (C) 46.5 (D) 126.0

The variance is equal to:

(A) 13.25 (B) 16.25 (C) 90.25 (D) 95.75

The value $E(2X+1)$ is equal to:

(A) 8 (B) 11 (C) 12 (D) 13

The variance of $2X+1$ (σ^2_{2X+1}) is equal to:

(A) 65 (B) 66 (C) 016.25 (D) 95.75

(33) ➔ **If the random variable X has normal distribution with mean μ and variance equal 4, and P(X > 1) = 0.9332, then μ equals to**

(A) 4 (B) 4.1 (C) 3 (D) 5

(34) ➔ **Suppose that the percentage of females in a certain population is 20%. A sample of 3 people is selected at random from this population**

The probability that no females are selected is

(A)0.512 (B) 0.613 (C) 0.84 (D) 0.36

The probability that at least 2 males are selected is

(A) 0.356 (B) 0.61 (C) 0.896 (D) 0.32

The expected number of males equals to

(A) 2.4 (B) 2.54 (C) 3.5 (D) 1.5

(35) ➔ **The average life of manufacture batteries is 5 years, with stander deviation of one year. Assuming the live of the battery follows approximately a normal distribution. If a random sample of 5 batteries selected from a manufacture has a mean of 3 years with a standard deviation of one year,**

then the random variable $\overline{X}$ has a mean $\mu_{\bar{x}}$ equal to

(A) 5 (B) 2 (C) 3 (D) 7

the variance $\sigma_{\bar{x}}^{2}$ is equal to

(A) 4 (B) 0.2 (C) 6 (D) 5

If P ($\overline{X} >$ k) = 0.9332, the value of k is

(A)5.4 (B) 4.5 (C) 3.4 (D) 4.3

the probability that the mean life of a random sample 16 of such batteries will be less than 5.5 years is

(A)0.9772 (B) 0.0228 (C) 0.2297 (D) 0.7729

(36) ➔ **A secretary makes 2 errors per page, on average. Using Poisson distribution, find**

The probability that on the next page he will make at least one error is

(A) 0.8647 (B) 0.4687 (C) 0.5687 (D) 0.6847

The expected number of error in 3 pages is

(A)8 (B) 6 (C) 3 (D) 5

(37) ➔ **Let E(X) = μ and Var(X)= σ^2.**

For any random variable X with mean μ and variance σ^2, we have

(A) $\sigma^2=\mu$ always (B) $\sigma^2>\mu$ always (C) $\sigma^2<\mu$ always (D) Non of these

For the random variable X having binomial distribution, we have

(A) $\sigma^2=\mu$ always (B) $\sigma^2>\mu$ always (C) $\sigma^2<\mu$ always (D) Non of these

For the random variable X having Poisson distribution, we have

(A) $\sigma^2=\mu$ always (B) $\sigma^2>\mu$ always (C) $\sigma^2<\mu$ always (D) Non of these

(38) ➔ **A survey of 500 students from a college of science shows that 275 students own computer of type A. let the true proportion for the population is π. Then 99% confidence interval for the true proportion is given by:**

(A) $-0.59 \le \pi \le 0.71$ **(B)** $0.49 \le \pi \le 0.61$

(C) $2.49 \le \pi \le 6.61$ **(D)** $0.3 \le \pi \le 0.7$

(39) ➔ **The following table gives the weight (in kg) lost by 6 healthy adults who fasted during Ramadan. Use the information to answer the next questions**

Class midpoint	Frequency f_i
2	2
4	3
8	1

$\sum (X_i - \overline{X})^2 f_i =$

(A) 20 (B) 26 (C) 14 (D) 24

The sample variance is:

(A) 4 (B) 5 (C) 3.66 (D) 4.8

(40) ➔ **The height (in inches) of female students who participated in the study are:**

61 66 68 68 63

The sample variance is:

(A) 13 (B) 9.70 (C) 2.16 (D) Non of these

The coefficient of variation is:

(A) 4.78 (B) 8.395 (C) 7.161 (D) Non of these

The Range is:

(A) **7.00** **(B)** **5.00** **(C)** **7.00** **(D)** **Non of these**

(41) ➔ **If for a certain sample we have** $\sum X^2 = 30$, $\sum X = 10$, **and** $n = 5$, **then the sample variance is:**

(A) 1.8 **(B) 1.6** **(C) 2.5** **(D) 1.44**

(42) ➔ **The standard deviation of 6, 6, 6, 6 is equal to:**

(A) 5 **(B) 0** **(C) 6** **(D) 36**

(44) ➔ **Let** X **denote the number of patients who arrive at the emergency department of King Khalid hospital. If** X **has Poisson distribution with an average 12 patients per hour, then the probability that:**

No patient arrives in 30 minutes is:

(A) e^{-8} **(B)** e^{-6} **(C)** e^{-7} **(D)** e^{-12}

At least 2 patients arrive on one hour is:

(A) $11e^{-12}$ **(B)** $(1-11e^{-8})$ **(C)** $(1-13e^{-12})$ **(D)** e^{-12}

At most one patient arrives in one and a half hour is:

(A) $19e^{-18}$ **(B)** $18e^{-8}$ **(C)** $16e^{-6}$ **(D)** $19e^{-12}$

3 patients arrive in a quarter of an hour is

(A) e^{-3} **(B)** $3e^{-7}$ **(C)** $\frac{9}{2}e^{-3}$ **(D)** e^{-12}

The expected number of patients who arrive in 10 hours is:

(A) 100 **(B) 120** **(C) 150** **(D) 125**