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Question No. 1:

Suppose that a manufactory has 100 employer classified as follows:

	Saudi	Not Saudi	Total
Night shift	15	35	50
No night shift	25	25	50
Total	40	60	100

The experiment is to randomly choose one of these employers:

(1) The probability that the chosen employer is Saudi and does not work night shift equals to:

(A)	0.45	(B)	**0.25**
(C)	0.05	(D)	0.85

(2) The probability that the chosen employer works night shift given that he is Saudi equals to:

(A)	**0.375**	(B)	0.075
(C)	0.575	(D)	0.475

Question No. 2:

Given the following probability distribution of a discrete random variable X representing the number of defective devices of a certain manufactory product:

x	1	2	3
$P(X = x)$	0.4	0.3	0.3

(3) The probability that the manufactory has at most two defective devices equals to:

(A)	0.5	(B)	0.2
(C)	0.9	(D)	**0.7**

(4) The variance of the defective devices equals to:

(A)	3.0	(B)	1.5
(C)	**0.69**	(D)	1.9

Question No. 3:

Suppose that the random variable X has a Binomial distribution with mean $\mu = 3$ variance $\sigma^2 = 3/2$, then:

(5) The value of n (number of trials) equals to:

(A)	**6**	(B)	5
(C)	3	(D)	4

(6) The value of p (probability of success) equals to:

(A)	0.25	(B)	**0.50**
(C)	0.33	(D)	0.56

(7) The $P(X = 3)$ equals to:

(A)	0.6125	(B)	0.5132
(C)	0.0156	(D)	**0.3125**

Question No. 4:

At a checkout counter, customers arrive at an average of 0.6 per minute. Assuming Poisson distribution, then

(8) The probability of two arrivals in a minute is:

(A)	**0.0988**	(B)	0.9012
(C)	0.3210	(D)	0.5

(9) The variance of the number of arrivals in five minutes equals to:

(A)	0.6	(B)	5
(C)	1	(D)	**3**

Question No. 5:

Suppose that a family has 5 children, 3 of them are girls and the rest are boys. A sample of 2 children is selected randomly without replacement.

(10) The probability that no girls are selected equals to:

(A)	0.2	(B)	0.4
(C)	0.6	(D)	**0.1**

(11) The expected number of girls in the sample equals to:

(A)	3.5	(B)	**1.2**
(C)	2.3	(D)	4.2

(12) The standard deviation of the number of girls in the sample equals to:

(A)	**0.60**	(B)	0.36
(C)	1.44	(D)	0.69

Question No. 6:

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:

(13) less than 11.84 centimeters of rain is:

(A)	**0.8238**	(B)	0.1762
(C)	0.7881	(D)	0.2018

(14) more than 5 centimeters but less than 7 centimeters of rain is:

(A)	0.8504	(B)	0.34221
(C)	0.6502	(D)	**0.1496**

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(15) more than 13.8 centimeters of rain is:

(A)	0.0526	(B)	0.9525
(C)	**0.0475**	(D)	0.4053

Question No. 12:

The average life of an industrial machine is 6 years, with a standard deviation of 1 year. If a random sample of 4 of such machines is selected and assumes that the life of such machines follows approximately a normal distribution, then:

(16) The expected value of the samples mean ($\bar{X}$) equals to:

(A)	5	(B)	**6**
(C)	7	(D)	8

(17) The variance of the samples mean ($\bar{X}$) equals to:

(A)	1	(B)	0.5
(C)	**0.25**	(D)	0.75

(18) $P(\bar{X} < 5.5)$ equals to:

(A)	**0.1587**	(B)	0.8413
(C)	0.4602	(D)	0.5398

(19) If $P(\bar{X} > a) = 0.1492$, then the numerical value of a equals to:

(A)	0.8508	(B)	1.04
(C)	0.2	(D)	**6.52**

Question No. 13:

A random sample of size 25 is taken from a normal population having a mean of 80 and a standard deviation of 5. A second independent random sample of size 36 is taken from a different normal population having a mean of 75 and a standard deviation of 3, then,

(20) $P(\bar{X}_1 - \bar{X}_2 < 2)$ equals to:

(A)	0.8508	(B)	0.2154
(C)	**0.0037**	(D)	0.2

(21) $P(1.5 < \bar{X}_1 - \bar{X}_2 < 2)$ equals to:

(A)	0.9972	(B)	**0.0028**
(C)	0.3451	(D)	0.1254

Question No. 14:

A quality control engineer is interested in the proportion of defective items in the population of certain type of car tires produced by his manufactory. In a random sample of 1000 items 100 are found to be defective.

(22) The point estimate for the true proportion of defective car tires is equals to:

(A)	**0. 10**	(B)	0.25
(C)	0.33	(D)	0.05

(23) the upper bound of the 95% confidence interval estimate for the true proportion equals to:

(A)	**0.119**	(B)	0.135
(C)	0.081	(D)	0.120

(24) The length of the 95% confidence interval estimate for the true proportion equals to:

(A)	0.119	(B)	0.135
(C)	0.081	(D)	**0.038**

Question No. 15:

Suppose that random samples of college freshmen are selected from two schools: 31 students from school A and 36 students from school B. The sample from school A has an average test score of 80 point while the sample from school B has an average test score of 75 point. Assuming that test scores in school A and B came from normal distribution with standard deviations σ_1=5 and σ_2=3, respectively.

(25) The point estimate of the difference between test scores ($\mu_A - \mu_B$) equals to:

(A)	6 points	(B)	**5 points**
(C)	10 points	(D)	20 point

(26) If we want to be 95% confident that the sample mean of school B will be within one (1) point of the true mean μ_B, the sample size of the second population equals to:

(A)	**35**	(B)	6
(C)	85	(D)	138

(27) The upper bound of the 99% confidence interval for the difference $\mu_A - \mu_B$ equals to:

(A)	5.02	(B)	2.35
(C)	**7.65**	(D)	2.99

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

(A)	**Increase**	(B)	Decrease
(C)	Still constant	(D)	Decrease and then increase

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(29) If we want to test $H_0 : \mu_A = \mu_B$ against $H_1 : \mu_A \neq \mu_B$, the test statistic is equals to:

(A)	1.024	(B)	8.121
(C)	**4.865**	(D)	2.005

(30) If we want to test $H_0 : \mu_A = \mu_B$ against $H_1 : \mu_A > \mu_B$, at $\alpha = 0.05$ then the Rejection Region (R.R.) is:

(A)	(-1.645, 1.645)	(B)	$(-\infty, 1.645)$
(C)	$(-\infty$, -1.645)	(D)	**(1.645, ∞)**

Question No. 16:

In a recent study at USA, 2.4 percent of the population reported being two or more races. However, the percent varies tremendously from state to state. Two random surveys are conducted. In state A, the random survey shows that out of 1000, only 9 people reported being of two or more races. In the state B: the second random survey shows that out of 500, only 17 people reported being of two or more races. We wish to conduct a hypothesis test to determine if the population proportions are the same for the two states or if the proportion for stat B is statistically higher than that for stat A.

(31) The null and alternative hypotheses are:

(A)	H_0: $P_B = P_A$, H_1: $P_B < P_A$
(B)	H_0: $P_B < P_A$, H_1: $P_B \neq P_A$
(C)	H_0: $P_B > P_A$, H_1: $P_B < P_A$
(D)	**H_0: $P_B = P_A$, H_1: $P_B > P_A$**

(32) The value of the test statistic equals to:

(A)	2.20	(B)	6.50
(C)	**3.50**	(D)	4.70

(33) If we conduct the test at $\alpha = 0.025$ then the Rejection Region (R.R.) of H_0 is:

(A)	(-1.96, 1.96)	(B)	$(-\infty, 1.96)$
(C)	$(-\infty$, -1.96)	(D)	**(1.96, ∞)**

(34) If we conduct the test at $\alpha = 0.025$ then we:

(A)	**Reject H_0**	(B)	Accept H_0
(C)	We can't decide	(D)	Reject H_0 and also reject H_1

Question No. 17:

A researcher was interested in comparing the mean score of female students (μ_f) with the mean score of male students (μ_m) in a certain test. Two independent samples gave the following results:

	First Sample	Second Sample
Sample size (n)	5	7
Sample mean ($\overline{X}$)	82.63	80.04
Sample variance (S^2)	15.05	20.79

Assume that the populations are normal with equal variances.

(35) The pooled estimate of the variance S_p^2 equals to:

(A)	17.994	(B)	17.794
(C)	18.094	(D)	**18.494**

(36) If we want to test H_o: $\mu_f = \mu_m$ against H_1: $\mu_f \neq \mu_m$ then the test statistic equals to:

(A)	T=2.029	(B)	**T= –1.0287**
(C)	Z= –1.539	(D)	Z=1.3239

(37) If we want to test H_o: $\mu_f = \mu_m$ against H_1: $\mu_f \neq \mu_m$ at α=0.1, then the Acceptance Region (A.R.) of H_o is:

(A)	**(–1.812,1.812)**	(B)	$(-1.812,\infty)$
(C)	(–1.372,1.372)	(D)	$(-\infty,1.812)$

(38) If we want to test H_o: $\mu_f = \mu_m$ against H_1: $\mu_f \neq \mu_m$ at α=0.1, then we:

(A)	Reject H_o	(B)	Can't decide
(C)	**Accept H_o**	(D)	Reject H_0 and also reject H_1