Question No. 1.

The following data show the number of traffic accidents at a particular intersection for five months: 8, 5, 2, 9, 4.

(1). The sample mean $\overline{X}$ equals:

(A) 28.0
(B) 5.60
(C) 7.00
(D) 5.00

(2). The sample variance S^2 equals:

(A) 8.30
(B) 6.64
(C) 44.09
(D) 68.89

Question No. 2.

In a photographic process, the developing time of prints may be considered as a random variable having the normal distribution with a mean of 16.28 second and a standard deviation of 0.12 second. Then, the probability that the developing time to develop one of the prints will be:

(3). anywhere from 16 to 16.5 second equals:

(A) 0.0435
(B) 0.1762
(C) 0.9565
(D) 0.2018

(4). at least 16.20 second equals:

(A) 0.7486
(B) 0.34221
(C) 0.6502
(D) 0.2514

(5). at most 16.35 second equals:

(A) 0.3101
(B) 0.7190
(C) 0.2810
(D) 0.4053

Question No. 3.

(6). If $Z \sim N(0,1)$, then $P(-1.33 \leq Z \leq 2.42)$ equals:

(A) 0.4521
(B) 0.9004
(C) 0.2315
(D) 0.4009

(7). Suppose that $Z \sim N(0,1)$. The value of k such that $P(Z \leq k)$ =0.0207 equals:

(A) -2.04
(B) 2.04
(C) 4.02
(D) -4.02

(8). The t- value with degree of freedom $\nu = 14$ that leaves an area of 0.95 to the left equals:

(A) 1.671
(B) 1.215
(C) 1.761
(D) 2.312

Question No. 4.

The life of a certain tire brand lives is a random variable X that follows the exponential distribution with a mean of 2 years.

(9). For $x > 0$, the cumulative distribution function (CDF) for the random variable X is:

(A) e^{-2}
(B) $1 - e^{-2}$
(C) e^{-x}
(D) $1 - e^{-\frac{x}{2}}$

(10). The probability that a tire of this brand will live less than 1.5 years is:

(A) 0.9534
(B) 0.3935
(C) 0.6065
(D) 0.5276

(11). The probability that a tire of this brand will live at least 3 years is:

(A) 0.6358
(B) 0.2231
(C) 0.4905
(D) 0.3679

Question No. 5.

Suppose that the number of traffic violation tickets issued by a policeman has a Poisson distribution with an average of 2.5 tickets per day.

(12). The average number of tickets issued by this policeman for a period of two days is:

(A) 2.00
(B) 1.25
(C) 2.50
(D) 5.00

(13). The probability that this policeman will issue 2 tickets in a period of two days is:

(A) 0.1404
(B) 0.2565
(C) 0.0842
(D) 0.1755

Question No. 6.

Suppose that 25% of the products of a manufacturing process are defective. Three items are selected at random, inspected, and classified as defective (D) or non-defective (N).

(14). The expected number of defective items equals:

(A) 0.75
(B) 0.70
(C) 0.25
(D) 1.20

(15). The variance of the number of defective items equals:

(A) 0.3425
(B) 0.6525
(C) 0.2556
(D) 0.5625

(16). The probability of getting at least two defective items equals:

(A) $\frac{10}{64}$
(B) $\frac{63}{64}$
(C) $\frac{5}{64}$
(D) $\frac{1}{64}$

(17). The probability of getting at most two defective items equals:

(A) $\frac{63}{64}$
(B) $\frac{5}{64}$
(C) $\frac{1}{64}$
(D) $\frac{10}{64}$

Question No. 7.

If $X_1, X_2, ..., X_n$ is a random sample of size n from any population with mean μ and finite variance σ^2. Denote the sample mean by $\overline{X}$.

(18). If the sample size $n \geq 30$ then $\overline{X}$ has approximately a normal distribution with *mean* and *variance* respectively equals:

(A) μ and σ
(B) μ and σ^2
(C) μ and $\sigma/\sqrt{n}$
(D) μ and σ^2/n

Question No. 8.

Suppose that we have two populations. The first with mean μ_1 and variance σ_1^2 and the second with mean μ_2 and variance σ_2^2. We select a random sample of size n_1 from the first population and another sample of size n_2 from the second population (assume that these two samples are independent). Let $\overline{X}_1$ be the sample mean of the first sample and $\overline{X}_2$ be the sample mean of the second sample. If n_1 and n_2 are large then:

(19). The expected value (mean) of $\overline{X}_1 - \overline{X}_2$ is:

(A) $\mu_1 + \mu_2$
(B) $\sqrt{\mu_1 - \mu_2}$
(C) $\mu_1 - \mu_2$
(D) $\sqrt{\mu_1} - \sqrt{\mu_2}$

(20). The variance of $\overline{X}_1 - \overline{X}_2$ is:

(A) $\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$
(B) $\sqrt{\frac{\sigma_1^2}{n_1}} + \sqrt{\frac{\sigma_2^2}{n_2}}$
(C) $\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}$
(D) $\frac{\sigma_1}{\sqrt{n_1}} + \frac{\sigma_2}{\sqrt{n_2}}$

Question No. 9.

Lots of 40 components each are called acceptable if they contain no more than 3 defectives. The procedure for sampling the lot is to select 5 components at random (without replacement) and to reject the lot if a defective is found.

(21). the probability that exactly one defective is found in the sample if there are 3 defectives in the entire lot equals:

(A) 0.1103
(B) 0.3011
(C) 0.1013
(D) 0.3110

(22). the expected value (mean) of the number of defectives in the sample equals:

(A) 0.375
(B) 0.213
(C) 0.821
(D) 0.735

(23). the variance of the number of defectives in the sample equals:

(A) 0.113298
(B) 0.311298
(C) 0.251471
(D) 0.174251

Question No. 10.

Suppose that the hemoglobin level for healthy adults males has a normal distribution with mean $\mu = 16$ and variance $\sigma^2 = 0.81$.

(24). the probability that a randomly chosen healthy adult male has hemoglobin level less than 14 equals:

(A) 0.1032
(B) 0.2013
(C) 0.0132
(D) 0.3210

(25). the percentage of healthy adult males who have hemoglobin level less than 14 equals:

(A) 2.45 %
(B) 4.21 %
(C) 1.25 %
(D) 1.32 %

Question No. 11.

A machine which manufactures a part for a car engine was observed over a period of time before a random sample of 300 parts was selected from those produced by this machine. Out of the 300 parts, 15 were defective. Then

(26). The proportion of defective parts in the sample equals:

(A) 15.0
(B) 0.15
(C) 0.05
(D) 300

(27). The standard deviation of the proportion of defective parts in the sample equals:

(A) 0.01258
(B) 0.26314
(C) 0.02136
(D) other value

Question No. 12.

(28). Suppose that $X_1, X_2, ..., X_n$ is a small random sample of size n from a normal distribution with mean μ and unknown variance σ^2. Let S^2 denote the sample variance, then the statistic $\frac{(\overline{X}-\mu)}{S/\sqrt{n}}$ has a:

(A) normal distribution
(B) standard normal distribution
(C) t- distribution with n-1 degree of freedom
(D) other distribution

Question No. 13.

From the same population, we independently select a random sample of size n_1 and another sample of size n_2. Let $\overline{X}_1$ be the sample mean of the first sample and $\overline{X}_2$ be the sample mean of the second sample. Let $n_1 < n_2$, then:

(29). the relation between the expected value of the two sample mean is:

(A) $E(\overline{X}_1) < E(\overline{X}_2)$
(B) $E(\overline{X}_1) > E(\overline{X}_2)$
(C) $E(\overline{X}_1) = E(\overline{X}_2)$
(D) can not compare

(30). the relation between the variance of the two sample mean is:

(A) $Var(\overline{X}_1) > Var(\overline{X}_2)$
(B) $Var(\overline{X}_1) < Var(\overline{X}_2)$
(C) $Var(\overline{X}_1) = Var(\overline{X}_2)$
(D) can not compare