IT2120 – Mid Revision Session

2025 September

Sample Questions

1) Many people believe that smartphones are causing an increase in sleep problems among teenagers. A researcher from Crestview High School wants to investigate this. She collects data by surveying 150 students from her school and finds that 60% of them report having trouble sleeping due to smartphone use.

   What is the sample in this study?

   A. All teenagers who use smartphones
   B. All students in Crestview High School
   C. The 60% of students who have sleep problems
   D. The 150 students who were surveyed
   E. All teenagers with sleep problems

2) The following box plot summarizes the test scores of students in two different classes, Class A and Class B, on the same math exam.

   (Imagine two side-by-side box plots are shown. See description below)

   - **Class A:**
     - Minimum = 40
     - Q1 = 50
     - Median = 60
     - Q3 = 70
     - Maximum = 80
   - **Class B:**
     - Minimum = 30
     - Q1 = 55
     - Median = 65
     - Q3 = 75
     - Maximum = 90

   Which of the following statements is **TRUE** based on the box plots?

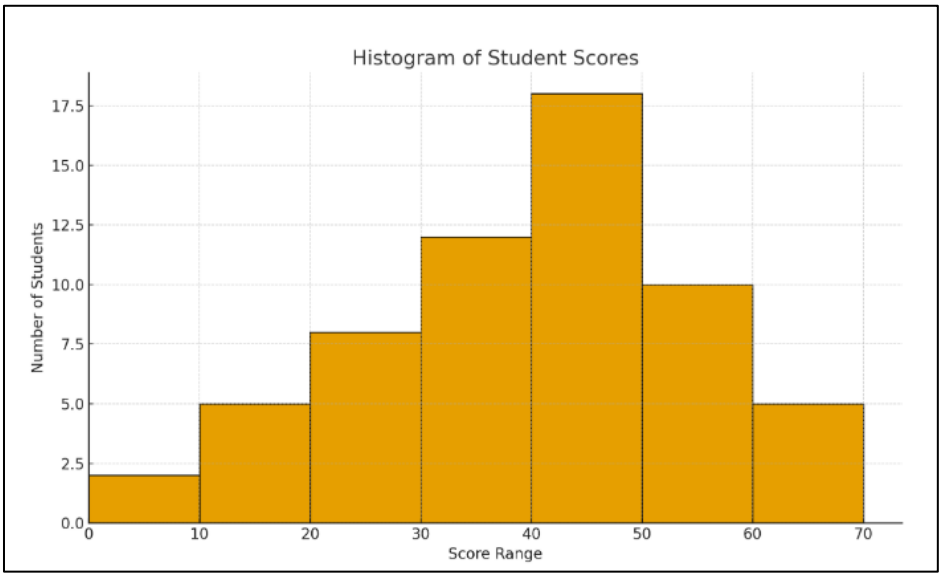
   A. The median score in Class A is higher than in Class B.
   B. Class A has a larger interquartile range than Class B.

C. Class B has a wider spread of scores than Class A.

D. More students in Class A scored above 75.

E. The lowest score in Class A is lower than in Class B.

3) The histogram shows the number of students who scored within certain score ranges on a recent statistics test.



Which of the following statements is **TRUE?**

A. The class with the highest frequency is 20–30.

B. The distribution is symmetric.

C. More students scored between 0–20 than between 60–70.

D. The total number of students is 100.

E. The fewest number of students scored between 40–50.

4) Which of the statements is **FALSE?**

A. Standard deviation is the square root of variance.

B. Standard deviation has the same units as the original data.

C. Standard deviation is always greater than or equal to zero.

D. Standard deviation is unaffected by extreme values in the data set.

E. None of the above

5) You have five T-shirts in each of the following colors: blue, brown, red, white, and black in a box. You reach into the box and randomly take out one T-shirt. After looking at it, you fold it back and return it to the box. Then you reach in and take out another T-shirt at random. What is the probability that you will pick a red shirt and a blue shirt?

A. 0.04
B. 0.2
C. 0.1
D. 0.8
E. 0.5

6) In a class of 40 students, 25 students passed Mathematics, 30 students passed English, and 18 students passed both subjects. If a student is selected at random from the class, what is the probability that the student passed Mathematics given that they passed English?

A. 0.60
B. 0.75
C. 0.50
D. 0.45
E. 0.40

7) A factory has three machines (A, B, and C) producing widgets:

- Machine A produces **40%** of the widgets and has a **2%** defect rate.
- Machine B produces **35%** of the widgets and has a **3%** defect rate.
- Machine C produces **25%** of the widgets and has a **5%** defect rate.

i. What is the probability that random selected widget is **defective**?

A. 0.051
B. 0.254
C. 0.339
D. 0.202
E. 0.031

ii. A widget is selected at random and is found to be defective. What is the probability that it was produced by Machine C?

A. 0.052
B. 0.4032
C. 0.331
D. 0.208
E. 0.117

8) Is the following a valid probability density function. Here, *X* taking values X=1, 2, 3?

$$P(X = x) = \frac{x}{10}$$

A. Yes, because all probabilities are positive.
B. No, because probabilities are greater than 1.
C. No, because the sum of the probabilities is not equal to 1.
D. Yes, because the expected value is less than 3.
E. No, because one of the probabilities is negative.

9) A factory produces light bulbs, and the probability that a randomly selected bulb is **not defective** is 0.4. If 3 bulbs are selected at random, what is the probability that **at least 2** of them are **not defective**?

A. 0.87040
B. 0.35200
C. 0.4428
D. 0.8801
E. None of the above

10) The number of errors found in a printed newspaper page has 1.2 errors per page. What is the probability that:

(a) A randomly selected page contains less than 2 errors?

A. 0.91243
B. 0.33737
C. 0.69881
D. 0.12051
E. 0.66263

(b) A randomly selected page contains more than 3 errors?

A. 0.12051
B. 0.29334
C. 0.69881
D. 0.03377
E. 0.69337

(c) In 5 randomly selected pages, no errors are found in total?

A. 0.11851
B. 0.00248
C. 0.30119
D. 0.03377
E. 0.99752

11) In a large batch of production process, the probability that a randomly selected item is defective is 0.01.

(a) Out of a sample of 300 items, what is the probability that more than 4 items are defective, using a suitable approximation?

- **A.** 0.17668
- **B.** 0.35277
- **C.** 0.15232
- **D.** 0.18474
- **E.** 0.19937

(b) Also, what is the rate of the distribution used in this approximation?

- **A.** 2.5
- **B.** 5
- **C.** 2
- **D.** 3.8
- **E.** 3

(c) What is the variance of the distribution?

- **A.** 2.5
- **B.** 5
- **C.** 2
- **D.** 3.8
- **E.** 3

12) Let *X* be a continuous random variable with the probability density function:

$$f(x) = kx(2 - x); 0 < x < 2$$

What is the value of the constant *k* so that *f(x)* is a valid probability density function?

- **A.** 1/4
- **B.** 2/5
- **C.** 3/4
- **D.** 7/8
- **E.** 3/8

13) Let X be a continuous random variable with probability density function,

$$f(x) = \begin{cases} 2x, & 0 \le x \le 1 \\ 0, & \text{otherwise} \end{cases}$$

Find the **mean** ($\mu = E(X)$) and **variance** ($\sigma^2 = V(X)$)of X.

A. $\mu = \frac{1}{2}, \sigma^2 = \frac{1}{12}$
B. $\mu = \frac{2}{3}, \sigma^2 = \frac{1}{18}$
C. $\mu = \frac{2}{3}, \sigma^2 = \frac{1}{9}$
D. $\mu = \frac{1}{2}, \sigma^2 = \frac{1}{6}$
E. $\mu = \frac{1}{3}, \sigma^2 = \frac{1}{18}$

14) A data set has the following 9 values arranged in ascending order:

4, 5, 7, 8, 9, 10, 11, 12, 30

How many outliers are in the data set?

A. 0
B. 1
C. 2
D. 3
E. 4

15) A fair coin is tossed once and a fair 6-sided die is rolled once. Let:

X be the number of heads (i.e., $X = 1$ if head, $X = 0$ if tail)
Y be the number shown on the die (from 1 to 6)

What is the joint probability mass function $P(X = x, Y = y)$?

A. $P(X = x, Y = y) = \frac{1}{12}, x = 0,1; y = 1,2, \dots, 6$
B. $P(X = x, Y = y) = \frac{1}{6}, x = 0,1; y = 1,2, \dots, 6$
C. $P(X = x, Y = y) = \frac{1}{2}, x = 0,1; y = 1,2, \dots, 6$
D. $P(X = x, Y = y) = \frac{1}{3}, x = 0,1; y = 1,2, \dots, 6$
E. $P(X = x, Y = y) = \frac{1}{18}, x = 0,1; y = 1,2, \dots, 6$