STATISTICS · MODULE I · MOCK EXAM

Practice exam 3

INFOMAAT
CENTRO RIPETIZIONI
SINCE 2011

SURNAME _____ NAME _____ ID NUMBER _____ VERSION _____

Instructions: answer the following 8 questions by selecting the correct answer. Each question has one correct answer only.

QUESTION 1

A discrete variable X takes the values 1, 2, 3, 4 with absolute frequencies 4, 6, 6, 4 (so $n = 20$). The value of the empirical cumulative distribution function at $x = 2.5$ is:

☐ (a) 0.30 ☐ (b) 0.80 ☐ (c) 0.50

QUESTION 2

Which of the following variables is quantitative and continuous?

☐ (a) Number of siblings ☐ (b) Time needed to complete a test ☐ (c) T-shirt size

QUESTION 3

The variable X has unbiased sample variance $s_X^2 = 6$. Let $Y = 2X - 5$. Then s_Y^2 is:

☐ (a) 24 ☐ (b) 19 ☐ (c) 7

QUESTION 4

Group 1 has $n_1 = 20$ observations with mean 5; group 2 has $n_2 = 30$ observations with mean 10. The overall mean is:

☐ (a) 7.5 ☐ (b) 8 ☐ (c) none of the other answers is correct

QUESTION 5

In a 2×3 contingency table with $n = 60$ observations the chi-squared statistic is $\chi^2 = 6$. The normalized statistic $\tilde{\chi}^2$ is:

☐ (a) 0.10 ☐ (b) 0.05 ☐ (c) none of the other answers is correct

QUESTION 6

Two variables have $s_X^2 = 4$, $s_Y^2 = 9$ and covariance $s_{X,Y} = -3$. Then s_{X+Y}^2 is:

☐ (a) 19 ☐ (b) 13 ☐ (c) 7

QUESTION 7

A teacher chooses 3 students out of a group of 6 to form a team. The order of selection does not matter. How many different teams can be formed?

☐ (a) 120 ☐ (b) 20 ☐ (c) 216

QUESTION 8

A discrete random variable X has probability mass function $f(0) = 0.5$, $f(1) = 0.3$, $f(2) = 0.2$. Its variance $V[X]$ is:

☐ (a) 0.61 ☐ (b) 1.10 ☐ (c) 0.70

Exercises

Solve Exercises 1 and 2 by reporting on this paper: formulas, main computations, results and comments.

EXERCISE 1 · 5 pt.

The dataset `coworking.RData` provides information on $n = 30$ coworking spaces. The variables are:

- `Price`: monthly price of a hot desk (in euro);
- `Comfort`: comfort level of the space (Basic, Standard, Premium);
- `City`: city where the space is located (Turin, Bologna);
- `Members`: number of members of the space.

1. Build the frequency table of `Comfort` (absolute, relative and cumulative relative frequencies), represent it with a suitable graph and compute the median. **[1 pt.]**
2. Compare the monthly price of the spaces in Turin and in Bologna using suitable measures of location and variability. Comment on the results. **[1.5 pt.]**
3. Build the contingency table of `Comfort` and `City`. Then compute the normalized χ^2 statistic and comment on the result. **[1.5 pt.]**
4. Compute the covariance and the correlation coefficient between `Members` and `Price`. Interpret the results. **[1 pt.]**

YOUR WORK

Exercise 2

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EXERCISE 2 · 3 pt.

A workshop buys the same electronic component from three suppliers, A, B and C. Supplier A provides 50% of the components, supplier B 30% and supplier C 20%. A component is defective with probability 0.01 if it comes from A, 0.02 if it comes from B and 0.05 if it comes from C. Answer the following questions. *(Use R, or a calculator, only to do the arithmetic.)*

1. Compute the probability that a component picked at random from the stock is defective. **[1 pt.]**
2. A component is found to be defective. Compute the probability that it was provided by supplier C. **[1 pt.]**
3. Suppose that 10 components are picked at random from the stock, independently of one another. What is the probability that at most one of them is defective? **[1 pt.]**

YOUR WORK