BUSINESS STATISTICS - Second Year | Academic Year 2005-06
Voluntary Quiz 1 | November 11, 2005

INSTRUCTIONS

1. The quiz contains multiple choice questions that must be answered in the orange code sheet we have provided you with.
2. To select an answer, all you need to do is mark in the orange code sheet, **filling the rectangle over which the selected answer is located appropriately**. Please make sure you know the answer you wish to mark before doing it. Even though you can always erase your mark if you have used a pencil (number 2 or similar), any mark that has not been completely erased could be read by the machine. Therefore, we advice you to first mark your selected answers in the exam and to use only the last ten minutes or so from the time assigned to the multiple choice questions part of the exam to copy them into the code sheet.
3. In the multiple choice questions part of the exam there is always **only one correct answer** for every question. Every question correctly answered is worth 1 point, while each question incorrectly answered will not penalize your grade at all. Questions that have not been answered do not penalize your grade in any form.
4. The quiz has three numbered sheets, going from 0.1 to 0.3. Please make sure that you have all sheets and contact your professor if this is not the case. There are different exam types. This exam is of type 0. Mark a 0 in the column labelled with I in your code sheet, just as it is illustrated in the example.
5. The maximum final grade is 11 points. **You will need to obtain 8 points to pass this quiz**.
7. Please fill in your personal information in the appropriate places in the code sheet.

Example:

12545 PEREZ, Ernesto Exam type 0 Resit

MULTIPLE CHOICE QUESTIONS (Time: 40 minutes)

1. FREE-QUESTION. The capital of Spain is:

   (A) Paris (B) Sebastopol (C) Madrid (D) Londres (E) Pekin

Questions 2 and 3 refer to the following exercise:

We have an exam that contains 20 multiple choice questions, each of those having 5 possible answers with only one correct answer. A student selected decides to answer the questions in a random manner.

2. What is the probability that the student correctly answers at least 6 of the 20 questions in the exam?

   (A) 0.8042 (B) 0.1746 (C) 0.0867 (D) 0.8254 (E) 0.1958

3. What is the expected number of correct answers that the student, under these conditions, would have?

   (A) 10 (B) 5 (C) 16 (D) 4 (E) 6

Questions 4 and 5 refer to the following exercise:

The probability that a patient who has been vaccinated against the flu presents side effects is 0.005. We assume independence between the different patients.

4. If 100 patients have been vaccinated against the flu, the approximate probability that no patient presents side effects is:

   (A) 0.3033 (B) 0.0067 (C) 0.6065 (D) 0.3935 (E) 0.9933

5. If 10,000 patients have been vaccinated against the flu, the approximate probability that at most 45 patients presents side effects is:

   (A) 0.6364 (B) 0.3636 (C) 0.2611 (D) 0.7556 (E) 0.7389

6. Let $\{X_n\}_{n\in\mathcal{N}}$ be a sequence of random variables having probability mass function given by:

$$P_n(x) = \begin{cases} \frac{2}{n^2} & \text{if } x = -1 \\ 1 - \frac{4}{n^2} & \text{if } x = 0 \\ \frac{2}{n^2} & \text{if } x = 1 \end{cases}$$

   The sequence of random variables will converge:

   (A) Only in distribution to $X = 0$

   (B) In distribution, probability and quadratic mean to $X = 0$

   (C) Only in probability to $X = 1$

   (D) Only in probability to $X = 0$

   (E) In distribution, probability and quadratic mean to $X = 1$

7. Let X be a random variable such that $X \in \gamma(\frac{1}{2}, 1)$. The value of $P(X < 2)$ is:

   (A) 0.0183 (B) 0.9817 (C) 0.6321 (D) 0.8475 (E) 0.3679

8. Let X be a random variable such that $X \in \gamma(r, s),\ r > 0,\ s > 0$. If we define the random variable $Y = 2rX$, then the distribution of Y is:

(A) $\gamma(1, s)$ (B) $\gamma(\frac{1}{2}, 2s)$ (C) $\gamma(2r, s)$ (D) $\gamma(2, s)$ (E) $\gamma(\frac{1}{2}, s)$

9. Let X be a random variable having a Student's t distribution with 3 degrees of freedom. The probability that X takes values between -0.978 and 1.64 is:

(A) 0.50 (B) 0.60 (C) 0.70 (D) 0.80 (E) 0.90

Questions 10 and 11 refer to the following exercise:

Let X_1, X_2 and X_3 be three independent random variables such that: $X_1 \in N(-5, \sigma^2 = 1)$, $X_2 \in N(0, \sigma^2 = 4)$ and $X_3 \in N(2, \sigma^2 = 9)$.

10. If we define the random variable $V = \dfrac{\sqrt{2}(X_3 - 2)}{3\left[\sqrt{(X_1 + 5)^2 + \left(\frac{X_2}{2}\right)^2}\right]}$, then the distribution of V is:

(A) $\mathcal{F}_{1,2}$ (B) χ^2_2 (C) t_1 (D) $\gamma(1, 2)$ (E) t_2

11. $P(V^2 \leq 18.5)$ is equal to:

(A) 0.90 (B) 0.01 (C) 0.95 (D) 0.10 (E) 0.05