BUSINESS STATISTICS - Second Year
Voluntary Quiz 1

Academic Year 2007-08
November 15, 2007

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 14 points. **You will need to obtain 10 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: 35 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:

The probability that a given firm commits an error when paying the salary to one of its workers is 0.001.

2. If the firm has 30 workers, what is the probability that the firm commits exactly two errors when paying their salaries?

   (A) 0.0291 (B) 0.9704 (C) 0.0118 (D) 0.0002 (E) 0.0004

3. If the firm has 1000 workers, what is the approximate probability that the firm commits at least two errors when paying their salaries?

   (A) 0.1839 (B) 0.7358 (C) 0.9197 (D) 0.0803 (E) 0.2642

Questions 4 to 6 refer to the following exercise:

The number of clients arriving each minute at a given branch of a bank follows a Poisson distribution with mean 2. It is assumed that arrivals at different minutes are independent from each other.

4. The probability that in a given minute no more than five clients arrive at this specific branch of the bank is:

   (A) 0.0166 (B) 0.9474 (C) 0.9834 (D) 0.0361 (E) 0.0526

5. The probability that, in a period of 4 minutes, more than 6 clients arrive at this specific branch of the bank is:

   (A) 0.3134 (B) 0.8088 (C) 0.1912 (D) 0.1221 (E) 0.6866

6. The probability that, in a period of 25 minutes, at most 45 clients arrive at this specific branch of the bank is:

   (A) 0.5398 (B) 0.2611 (C) 0.7642 (D) 0.4602 (E) 0.7389

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

$$P(X_n = -1/n^2) = P(X_n = 1/n^2) = \frac{3}{8}, \qquad P(X_n = 1) = \frac{1}{4}$$

   The sequence will converge:

   (A) In distribution to a binary $b(p = \frac{1}{4})$ random variable

   (B) In distribution to a $N(0, 1)$ random variable

   (C) In distribution to $X = 0$

   (D) In distribution to $X = 1$

   (E) All false

8. Let $\{X_n\}_{n\in\mathcal{N}}$ be a sequence of random variables such that $X_n \in N\left(0, \frac{1}{n^2}\right)$. The sequence will converge:
   (A) In distribution to a $N(0,1)$ random variable
   (B) In distribution and probability to $X = 1$
   (C) In distribution and probability to $X = 0$
   (D) Only in distribution to $X = 0$
   (E) In distribution to a $U(0,1)$ random variable

9. Let X be a random variable having a $\gamma(\frac{1}{2}, \frac{5}{2})$ distribution. The distribution of the r.v. $Y = \frac{3X}{2}$ is:
   (A) $\gamma(\frac{1}{3}, \frac{5}{2})$ (B) $\gamma(\frac{1}{2}, 2)$ (C) $\gamma(3, \frac{5}{2})$ (D) $\gamma(2, \frac{5}{2})$ (E) $\gamma(\frac{3}{2}, \frac{5}{2})$

10. Let X be a random variable having an exponential distribution with variance $\frac{1}{4}$. Then, $P(X < \frac{1}{2})$ is, approximately:
   (A) 0.37 (B) 0.63 (C) 0.22 (D) 0.86 (E) 0.14

11. Let X be a random variable having a χ^2_n distribution. Then, we have that:
   (A) $\chi^2_{n,\alpha} < \chi^2_{n,\frac{\alpha}{2}}$ (B) $\chi^2_{n,\alpha} = \chi^2_{n,1-\alpha}$ (C) $\chi^2_{n,\alpha} > \chi^2_{n,\frac{\alpha}{2}}$ (D) $\chi^2_{n,\frac{\alpha}{2}} > \chi^2_{n,\frac{\alpha}{4}}$ (E) $\chi^2_{n,\alpha} = \chi^2_{n,1-\frac{\alpha}{2}}$

12. Let X be a random variable having a χ^2_{20} distribution. Then, $P(-1 < X < 23.8)$ is:
   (A) 0.90 (B) 0.25 (C) It cannot be determined (D) 0.10 (E) 0.75

13. Let X be a random variable having a t_{10} distribution. Then, $P(0.542 < X < 1.81)$ is:
   (A) 0.60 (B) 0.90 (C) 0.75 (D) 0.40 (E) 0.25

14. Let X be a random variable having a $\mathcal{F}_{8,10}$ distribution. Then, $P(X < 5.06)$ is:
   (A) 0.90 (B) 0.95 (C) 0.01 (D) 0.99 (E) 0.05