BUSINESS STATISTICS - Second Year
Voluntary Quiz 2

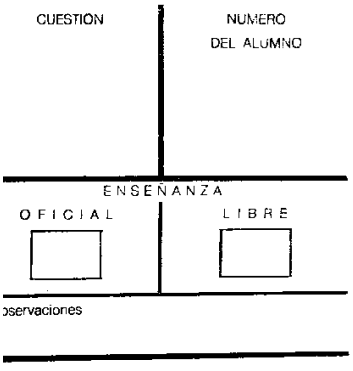
Academic Year 2010-11
January 14, 2011

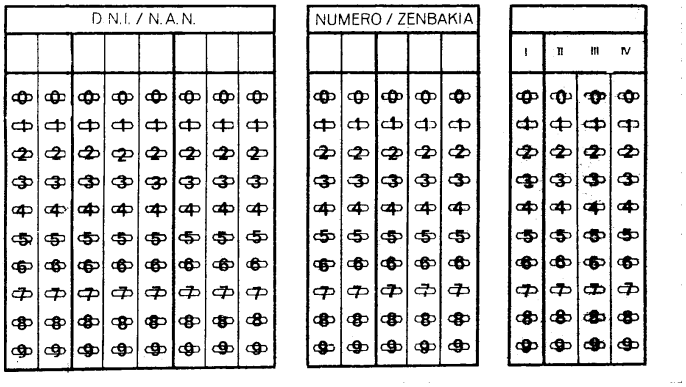
INSTRUCTIONS

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 four 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 15 points. **You will need to obtain 11 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: 45 minutes)

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

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

Questions 2 to 5 refer to the following exercise:

Let X be a random variable having a uniform distribution $U[0, 2\theta+1]$. In order to estimate the parameter θ, a random sample of size n, $X_1, \ldots, X_n$, has been taken.

2. The method of moments estimator of θ is:

   (A) $\overline{X} - 1$ (B) $\overline{X} - \frac{1}{2}$ (C) $2\overline{X}$ (D) $\frac{1}{2} - \overline{X}$ (E) $2\overline{X} - 1$

3. Is the method of moments estimator unbiased?

   (A) No (B) - (C) Yes (D) - (E) -

4. The variance of the method of moments estimator is:

   (A) $\frac{\theta^2}{12n}$ (B) $\frac{(2\theta+1)^2}{12n}$ (C) $\frac{(2\theta+1)}{12n}$ (D) $\frac{\theta^2}{12}$ (E) $\frac{(2\theta+1)^2}{12}$

5. The maximum likelihood estimator of θ is:

   (A) $\frac{\max(X_i)-1}{2}$ (B) $\min(X_i)$ (C) $\max(X_i)$ (D) $\frac{\min(X_i)-1}{2}$ (E) $\overline{X} - \frac{1}{2}$

Questions 6 and 7 refer to the following exercise:

Let $X_1, \ldots, X_4$ be a r.s. taken from a normal population having mean m and variance σ^2.

6. If we consider $Z_1 = (X_1 + X_2)/2$ and $Z_2 = (X_3 + X_4)/2$, and define the statistic $Z = \theta Z_1 + (1-\theta)Z_2$, $0 < \theta < 1$, the value of θ that makes Z an unbiased estimator of m is:

   (A) only $\theta = 0$ (B) only $\theta = 0.50$ (C) only $\theta = 0.30$
   (D) any θ value such that $0 < \theta < 1$ (E) only $\theta = 1$

7. The value of θ that minimizes the variance of Z is:

   (A) $\theta = 1$ (B) $\theta = 0.8$ (C) $\theta = 0$ (D) $\theta = 0.3$ (E) $\theta = 0.5$

8. We have a random sample of size n from a Poisson distribution with parameter λ. As an estimator of λ, we have decided to use $\hat{\lambda} = \overline{X} + \dfrac{2}{n^2}$. Is this a consistent estimator of λ?

   (A) Yes (B) - (C) - (D) - (E) No

Questions 9 and 10 refer to the following exercise:

Let X be a r.v. with probability mass function given by: $P(X = -1) = \frac{1-\theta}{2}$, $P(X = 0) = \frac{1-\theta}{2}$, $P(X = 1) = \theta$. In order to estimate the parameter θ, a r.s. has been taken providing the following results: $X = -1$ was was obtained in n_1 occasions, $X = 0$ was obtained in n_2 occasions and $X = 1$ was obtained in n_3 occasions, where $n = n_1 + n_2 + n_3$.

9. The maximum likelihood estimator of the parameter θ is:

(A) $\frac{n_3}{n}$ (B) $\frac{2\overline{X}}{3}$ (C) $\frac{n_1+n_3}{n}$ (D) $\frac{2\overline{X}}{3}+\frac{1}{3}$ (E) $\overline{X}$

10. The method of moments estimator of the parameter θ is:

(A) $\frac{n_1+n_3}{n}$ (B) $\frac{2\overline{X}}{3}$ (C) $\overline{X}$ (D) $\frac{2\overline{X}}{3}+\frac{1}{3}$ (E) $\frac{n_3}{n}$

Questions 11 to 13 refer to the following exercise:

Let X be a r.v. una v.a. with probability density function given by:

$$f(x;\theta)=\sqrt{\theta}x^{\sqrt{\theta}-1}, \qquad 0<x\leq 1, \qquad \theta>0$$

We wish to test the null hypothesis $H_0:\theta=1$ against the alternative hypothesis $H_1:\theta=4$. In order to do so, a random sample of size $n=1$ is taken (i.e., we observe X).

11. The most powerful critical region for X for this test is of the form:

(A) All false (B) $(K,1)$ (C) $(K_1,K_2)^c,\ K_2\neq 1$
(D) $(0,K)$ (E) $(K_1,K_2),\ K_2\neq 1$

12. If $\alpha=0.05$, the most powerful critical region is:

(A) $(0,0.95)$ (B) $(0,0.05)$ (C) $(0.95,1)$ (D) $(0.05,0.95)$ (E) $[0.05,0.95]^c$

13. The power of the test is:

(A) 0.0025 (B) 0.9025 (C) 0.6561 (D) 0.0975 (E) 0.3439

Questions 14 and 15 refer to the following exercise:

An individual is interested in buying a netbook. Before doing so, he decides to ask for its price at 26 different stores, obtaining a mean price of 210 euros with a standard deviation of 15 euros. We assume normality.

14. A 90% confidence interval for the netbook's mean price is:

(A) (204.87, 215.13) (B) (199.70, 220.30) (C) (195.00, 225.00)
(D) (201.80, 218.20) (E) (206.04 213.96)

15. A 90% confidence interval for the netbook's standard deviation is:

(A) (12.46, 20.02) (B) (170.06, 354.55) (C) (155.17, 400.68)
(D) (13.04, 18.83) (E) (10.34, 26.71)