THE UNIVERSITY OF Zambia

SCHOOL OF HUMANITIES AND SOCIAL SCIENCES

SS242 END OF SEMESTER TEST – APRIL 2009

JATNE

TIME: ONE HOUR AND TWENTY MINUTES

INSTRUCTIONS: ANSWER ALL QUESTIONS

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1. Indicate if the statements below are (i) true (ii) false (iii) neither

   a) A one-tailed test is used when a researcher has a non-directional hypothesis

   b) A two tailed test is used when a researcher has a directional hypothesis

   c) A one-tailed test is also used when a researcher has a directional hypothesis.

2. Indicate the type of error I or II that is likely to be committed given the two scenarios below:

   a) The significance level is increased from 3% to 9%

   b) The significance level is decreased from 11% to 1%

3. Indicate which of the following examples below refers to (a) descriptive (b) inferential statistics or (c) or neither.

   a) A social scientist concluding, on the basis of sample information, that the English proficiency level among all primary school students in the country has improved since the introduction of English medium of instruction.

   b) The social scientist giving a statistical breakdown of the primary students in his EMI project in the form of bar and pie charts and histograms to depict the age and sex composition of the sample.

4. Select one correct option out of the bolded options below:

   a) A distribution is symmetrical if the coefficient of skewness is **zero/negative /positive**
   b) A distribution is negatively skewed if the coefficient of skewness is **zero/negative /positive**
   c) A distribution is positively skewed if the coefficient of skewness **is zero/negative /positive**

5. Complete the following statements below

   a) Events are mutually exclusive if the occurrence of one event.....
   b) Events are independent if the occurrence of one event.....
   c) Events are dependent if the occurrence of one event.....

6. From a survey of households in Lusaka, the crime figures in the table below were estimated.

| Crime | Number Reported | Number Not Reported | Total |
|---|---|---|---|
| Murder | 12 | 12 | 24 |
| Robbery | 145 | 105 | 250 |
| Assault | 85 | 177 | 262 |
| rape | 12 | 60 | 72 |
| auto theft | 314 | 62 | 376 |
| total | 568 | 416 | 984 |

a) What is the probability that a crime is reported?
b) What is the probability that a crime is reported given that an assault occurs?
c) What is the probability that the crime is a rape and it is reported?
d) What is the probability that a crime is reported or that the crime is a robbery?

7. The mean amount of time for a teller at ZANACO to serve a customer is 27.2 minutes, with a standard deviation of 4.9 minutes. What is the probability that a customer is served,

a) Between 22.3 and 32.1 minutes?
b) Between 27.4 and 37 minutes?
c) Under 12.5 minutes?
d) Over 41.9 minutes?

8. Zambian prison authorities at are concerned about the number of violent incidents in its prisons. After examining the 10 prisons in the country, a data analyst finds the following pattern of data for the number of violent incidents last month:

17 21 42 32 16
24 31 15 22 26

Calculate and interpret the:

a) Mean
b) Median
c) Mode
d) Standard deviation

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**END OF TEST**

## Question One (1)

a) False ✓
b) False ✓
c) True ✓

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## Question two (2)

Que2

a) Type 1 error ✓
This is the error you commit by rejecting the null hypothesis when it is actually true

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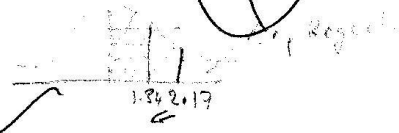
| | 3% | 7% |
|---|---|---|
| Z | 2.17 | 1.34 |




b) Type II error ✓
This is the error you commit by ~~reje~~ accepting the null hypothesis when it is actually false

| | 11% | 1% |
|---|---|---|
| Z | 1.23 | 2.33 |


## Question 3

Ques

a) Inferential statistic ✓
b) Descriptive statistic ✓

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## Question 4

Ques

a) Zero ✓
b) Negative ✓
c) positive ✓

6

7

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## Question 5

a) Events are mutually exclusive if the occurrence of one event does not occur at the same time as simultaneously with another event

b) Events are independent if the occurrence of one event are not affected by the occurrence of another event

c) Events are dependent if the occurrence of one event is affected by the occurrence of another event.

## Question Six (6)

Que6

| Crime | Number reported | Number Not Reported | Total |
|---|---|---|---|
| murder (M) | 12 | 12 | 24 |
| Robbery (R) | 145 | 105 | 250 |
| Assault (A) | 85 | 177 | 262 |
| Rape (r) | 12 | 60 | 72 |
| auto theft (a) | 314 | 62 | 376 |
| total | 568 | 416 | 984 |

Number reported = NR , Number not reported = NNR

a) $P(NR) = \frac{560}{984} =$

$= 0.571$

b) $P(NR/A) = \frac{P(NR \cap A)}{P(A)}$

$= \frac{85}{262}$

$= 0.32$

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## Question Six

i) $P(r \cap NR) = P(r) \times P(NR/r)$

$= P(r) \times \frac{P(NR \cap r)}{P(r)}$

$= \frac{72}{984} \times \frac{12}{72}$ ✓

$= 0.012$

(4)

d) $P(NR \cup R) = P(NR) + P(R) - P(NR \cap R)$

$= \frac{568}{984} + \frac{250}{984} - \frac{145}{984}\left(\frac{568}{984} \times \frac{145}{568}\right)$

$= \frac{568}{984} + \frac{250}{984} - \frac{145}{984}$

$= \frac{673}{984}$

$= 0.68$

(4)

## Question 7

Qn 7

$\mu = 27.2 \quad \sigma = 4.9$

a) $Z = \frac{x - \mu}{\sigma}$

$= \frac{22.3 - 27.2}{4.9}$

$= -1$ ✓

$= 0.3413$ ✓

$Z = \frac{x - \mu}{\sigma}$

$= \frac{32.1 - 27.2}{4.9}$

$= 1$ ✓

$= 0.3413$

(4)

12 probability is $= 0.3413 + 0.3413$

$= 0$

## Question 7

b) $\mu = 27.2 \quad \sigma = 4.9$

$Z = \frac{x - \mu}{\sigma}$

$= \frac{27.4 - 27.2}{4.9}$

$= 0.04$

$= 0.0160$

$Z = \frac{x - \mu}{\sigma}$

$= \frac{37 - 27.2}{4.9}$

$= 2$

$= 0.4772$

∴ The probability is $= 0.4772 - 0.0160$

$= 0.4612$

c) $\mu = 27.2 \quad \sigma = 4.9$

$Z = \frac{x - \mu}{\sigma}$

$= \frac{12.5 - 27.2}{4.9}$

$= -3$

$= 0.4987$

$= 0.5 - 0.4987$

$= 0.0013$

∴ The probability is $0.0013$

d) $\mu = 27.2 \quad \sigma = 4.9$

$Z = \frac{41.9 - 27.2}{4.9} = 3$

$= 0.4987$

$= 0.5 - 0.4987$

$= 0.0013$

∴ The probability is

## Question 8

| X | $(x-\bar{x})$ | $(x-\bar{x})^2$ |
|---|---|---|
| 15 | (-9.6) | 92.16 |
| 16 | (-8.6) | 73.96 |
| 17 | (-7.6) | 57.76 |
| 21 | (-3.6) | 12.96 |
| 22 | (-2.6) | 6.76 |
| 24 | (0.6) | 0.36 |
| 26 | (1.4) | 1.96 |
| 31 | (6.4) | 40.96 |
| 32 | (7.4) | 54.76 |
| 42 | (17.4) | 302.76 |
| | | $\Sigma = 638.4$ |

a) $\bar{X} = \frac{\Sigma fx}{n} = \frac{15+16+17+21+22+24+26+31+32+42}{10}$

$\bar{x} = 24.6$ (2)

Interpretation

- each prisons is expected to have 24.6 members violent incidents last month (3)

b) Median (md) $= \frac{1}{2}(n+1)^{th}$

$= \frac{1}{2}(10+1)$

$= \frac{11}{2} = 5.5$

$= \frac{22+24}{2}$

md = 23 (3)

Interpretation

- Half of the prisons had below 23 members of violent incident last month (2)

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