

# قسم الإحصاء

أسئلة امتحانات الدور الثاني

الدراسات العليا / الماجستير

للعام الدراسي

2024 - 2023



**\*Remark : Answer five questions only, for each question(14 marks).**

Q1/ A/ If we had two teaching methods, they were applied to two samples of students to demonstrate the effect of each method on the students' level, then

- 1- Put the hypothesis for this case.
- 2- Choose the appropriate test statistic.
- 3- If  $\sum R1 = 70$   $\sum R2 = 35$  and  $U = 7$ , critical value = 8. Compare the obtained value with the critical value, then interpret and reporting the results.

B/ What strategies can be followed if the data is not normally distributed?  
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Q2/ A/ If we want to use the kolmogorov-smirnov for two sample test explain this:

- 1- What is the assumption for this test
- 2- What is the hypothesis for this test
- 3- For his data find the empirical distribution function for each sample

Sample1: 48,40,39,50,41,41

Sample2: 14,18,20,10,12,102

B/ If we have the following types of analyses, what are the procedures or parametric and nonparametric tests for each analysis?

- 1- Comparing two related samples
  - 2- Comparing two unrelated samples
- 

Q3/A/ Find the median confidence interval. If the differences between each sample pair is flows, Differences: 0 -3 +12 +7 +4 +23 -4 +1

Note: If  $(n=7,0.05)$  then  $T= 2$ ,  $(n=8,0.05)$  then  $T= 3$ ,  $(n=9,0.05)$  then  $T= 5$ .

B/ Explain how to find the two-tailed probability estimate p.  
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Q4/A/ If we want to comparing more than two related samples then:

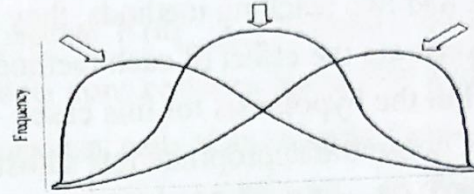
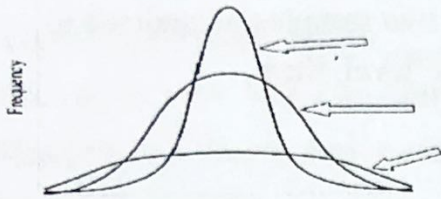
- 1- How to compute the test in detail.
- 2- What is a post hoc tests for this test.
- 3- How to perform this test using spss.







Q4/B/ Define the kurtosis and skewness, and then put the appropriate visas for each figure:



Q5/ For the following data, which represent three unrelated samples, find each of the following.

- 1- What is the appropriate hypothesis?
- 2- What is the appropriate test with details?
- 3- Compute the ties correction.

Sample 1	Sample 2	Sample 3
18	16	11
22	18	14
13	15	22
17	22	27
24	25	33

Q6/ A researcher wishes to determine if there is an association between the level of a teacher's education and his/her job satisfaction. He surveyed 158 teachers. The frequencies of the corresponding results are displayed in table below.

	Teacher education level (observed)			Row total
	Bachelor's degree	Master's degree	Post-Master's degree	
Satisfied	60	41	19	120
Unsatisfied	10	13	15	38
Column totals	70	54	34	158

First, use  $\chi^2$ -test for independence with  $\alpha = 0.05$  to determine if there is an association between level of education and job satisfaction. Then, determine the effect size for the association. Report your findings.

Ass. Prof Dr. Asma A. Yaqoob  
 Lecturer

**GOOD LUCK**

Ass. prof Dr. Bahaa A. Qassem  
 Head of Dept.





**\*Remark : Answer all questions**

**Q1/ Fill in the following spaces with a suitable word from your textbook (20 MARKS):**

Wales is in northern Europe. It is (i) \_\_\_\_\_ of the United Kingdom. It (ii) \_\_\_\_\_ England to the east and has the Irish Sea on the west. Wales was (iii) \_\_\_\_\_ by England for many centuries, but in 1999 its own (iv) \_\_\_\_\_ Assembly was created. Farming and (v) \_\_\_\_\_ are important parts of its economy Tourists come to Wales to see its many (vi) \_\_\_\_\_ castles, to walk and (vii) \_\_\_\_\_ in its beautiful (viii) \_\_\_\_\_, or to walk along its wild (ix) \_\_\_\_\_. Although most people speak English, both Welsh and English are the official (x) \_\_\_\_\_.

**Q2/ Select the correct choice from each sentence below. ANSER ONLY 10. (10 MARKS):**

1. The lawyer \_\_\_\_\_ convincingly in court to defend her client's case. (**ARGUE**: Simple Present)

Is arguing	Has been arguing
Has argued	argues

2. She \_\_\_\_\_ her viewpoint in the debate for nearly an hour by the time it's scheduled to conclude. (**ASSERT**: Future Perfect Continuous)

will have been asserting	will be asserting
will have asserted	Will assert

3. The research team \_\_\_\_\_ all the samples by the end of the month, ready for analysis. (**CATEGORIZE**: Future Perfect)

will have categorized	will have been categorizing
will be categorizing	will categorize

4. During next week's seminar, she \_\_\_\_\_ her points with real-world examples to engage the audience more effectively. (**EXEMPLIFY**: Future Continuous)

will have been exemplifying	will exemplify
will have exemplified	will be exemplifying

5. The study \_\_\_\_\_ with recommendations for further research. (**CONCLUDE**: Simple Future)





6. The team \_\_\_\_\_ the case for months before they stumbled upon the crucial evidence.  
 (INVESTIGATE: Past Perfect Continuous)

investigated	is investigating
had investigated	had been investigating

7. He \_\_\_\_\_ the various chemical compounds before realizing one key ingredient was missing.  
 (SYNTHESIZE: Past Perfect)

synthesized	had been synthesizing
had synthesized	Was synthesizing

8. The committee \_\_\_\_\_ the latest research findings when the unexpected discovery was announced.  
 (REVIEW: Past Continuous)

had reviewed	was reviewing
reviewed	Had been reviewing

9. The expert \_\_\_\_\_ the data from the experiment during last week's conference. (INTERPRET: Simple Past)

Was interpreting	Had interpreted
had been interpreting	Interpreted

10. The committee \_\_\_\_\_ the proposals for the new research grant since last month. (EVALUATE: Present Perfect Continuous)

has been evaluating	Evaluates
has evaluated	is evaluating

11. Researchers \_\_\_\_\_ several key factors that contribute to the success of the project. (IDENTIFY: Present Perfect)

identifying	have identified
been identifying	Identifies

12. She \_\_\_\_\_ the themes of two novels to highlight how each author approaches the subject of identity.  
 (CONTRAST: Present Continuous)

contrasting	has contrasted
contrasts	has been contrasting





**Q3/ Write about either A or B (at least 150 words): (10 MARKS)**

- A. *The Impact of Social Media on Modern Communication.*
- B. *The Role of Women in Leadership.*

**Q4/ Re-write the following sentence with the required verbs and tenses. ANSER ONLY 10. (20 MARKS):**

A) The scientist _____ the chemical composition of the sample to determine its properties. (ANALYZE: Simple Present)	B) I _____ the economic policies of two different countries to understand their impacts on global trade. (COMPARE: Present Continuous)
C) The professor _____ the complex theory in such a way that even beginners can understand it. (EXPLAIN: Present Perfect)	D) We _____ the implications of climate change on marine biodiversity for the past two hours. (DISCUSS: Present Perfect Continuous)
E) She _____ a new technique in her workshop yesterday that captivated the entire audience. (DEMONSTRATE: Simple Past)	F) She _____ her theory by conducting a series of complex experiments when the power outage occurred. (PROVE: Past Continuous)
G) By the time the meeting began, she _____ her argument with extensive statistical data. (SUPPORT: Past Perfect)	H) She _____ the data for several hours before she finally understood the underlying patterns. (INTERPRET: Past Perfect Continuous)
I) The team _____ the case for months before they stumbled upon the crucial evidence. (INVESTIGATE: Past Perfect Continuous)	J) I _____ the key terms at the beginning of my lecture tomorrow. (DEFINE: Simple Future)
K) Tomorrow at this time, I _____ the complex parts of our proposal to ensure everyone understands our objectives. (CLARIFY: Future Continuous)	L) By this time next week, I _____ the entire novel for our book club discussion. (SYNOPSISIZE: Future Perfect)

**Q5/ Select the correct choice from the words in the following table to fill in the spaces below (10 MARKS):**

<i>official.</i>	<i>independent.</i>	<i>Equator.</i>	<i>often.</i>	<i>island.</i>
<i>Ocean.</i>	<i>historic.</i>	<i>Republic.</i>	<i>attractions.</i>	<i>Desert.</i>
<i>business.</i>	<i>Kingdom.</i>	<i>wonderful.</i>	<i>mining.</i>	<i>destination.</i>





The (a) \_\_\_\_\_ of Morocco is a country in North Africa. It has the Atlantic (b) \_\_\_\_\_ to the west, the Mediterranean Sea to the north, Algeria to the east, and Western Sahara to the south. It became an independent kingdom in 1956. Its economy depends on (c) \_\_\_\_\_ and tourism. Morocco's (d) \_\_\_\_\_ include the (e) \_\_\_\_\_ city of Fez, the (f) \_\_\_\_\_ beaches on the Atlantic and Mediterranean, and the Sahara (g) \_\_\_\_\_. Arabic is the (h) \_\_\_\_\_ language, although French is (i) \_\_\_\_\_ used for (j) \_\_\_\_\_.

GOOD LUCK

Lecturer

Ayael M. Abood

Ass. prof Dr. Bahaa A. Qassem  
Head of Dept.



\*Remark : Answer five questions only

Q1/ Write a program to compute X where  $aX^2 + bX + c = 0$  , when  $a=0$  then :  
 $X = \frac{-c}{b}$  and  $X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$  if  $a \neq 0$  (14 marks)

Q2/ If  $X = 2 + \log(Z)$  and  $Y = x - x^2 + x^3 - x^4 + x^5 - x^6$   
 Write a program to compute Y and then find  $\bar{Y}$  to 50 Values of X. (14 marks)

Q3/ If  $X_i \sim N(2, 9)$  Write a program to compute Y where :  
 $Y = 2X + \sin(h)$  where  $h = e^{-X_i}$  (14 marks)

Q4/ If  $X_i \sim EXP(b)$  then : Write a program to compute  $Y_i$  where :  
 $Y_i = \ln(X_i)$  and compute  $\bar{X}$  and  $\bar{Y}$ . (14 marks)

Q5/ Write a program to compute  $Z_i$  where  $i=1,2,\dots,n$  : (14 marks)

$$Z = \begin{cases} \sqrt{a+b+c} & \text{if } j = 1 \\ \frac{\sqrt{a+b+c}}{abc} & \text{if } j = 2 \\ \log(a+b+c) & \text{if } j = 3 \end{cases}$$

Q6/ Let you have 100 values of  $X_i, Y_i, i=1,2,3,\dots,50$  Write a program to compute r  
 where : (14 marks)

$$r = \frac{\sum X_i Y_i - \sum X_i \sum Y_i / n}{[\sum X_i^2 - \sum \frac{X_i^2}{n}] [\sum Y_i^2 - \sum \frac{Y_i^2}{n}]}$$

GOOD LUCK

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 Lecturer

Ass. prof Dr. Bahaa A. Qassem  
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\*Remark : Answer 5 questions only

Q1/ If  $X \sim \text{Binomial}(n, p)$  and let  $n \sim \text{poisson}(m)$ . Find compound binomial distribution. (14 marks)

Q2/ Find the Exponential - Exponential mixed distribution and then :

1- find the mean of the mixed distribution

2- find  $p(1 < X < 2)$  IF  $\lambda = 3$  &  $w = \frac{1}{3}$  (14 marks)

Q3/ (A)- If  $f(x) = \begin{cases} 1 - \frac{x}{2} & 0 < X < 2 \\ 0 & o.w \end{cases}$

Find p.d.f of  $X$  on the period  $[0,1]$  (7 marks)

(B) - Let the probability density function of a random variable : (7 degree)

$$f(x) = \begin{cases} 5e^{-5x} & , X > 0 \\ 0 & , o.w \end{cases}$$

What is the approximate value of  $P(|X - \mu| \leq \frac{\sigma}{2})$  when one uses the Chebychev inequality (7 marks)

Q4/ Let  $x$  be r.v having p.d.f  $f(x) = \begin{cases} e^{x-2} & X < 2 \\ 0 & o.w \end{cases}$  (14 marks)

find the distribution of  $y = x-2$  by using transformation technique

Q5/ let  $X \sim \text{EXP}(\lambda)$ ,  $x > 0$  & Let  $t \sim \text{EXP}(\lambda)$ ,  $t > 0$  (14 marks)

using T-X Family to find compound distribution (Exponential- Exponential) .

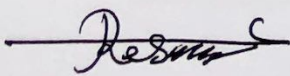
Q6/ Let  $y_1 < y_2 < y_3 < y_4$  be the order ststastic of a random sample of

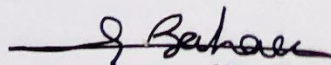
size (4) from a distribution :  $f(x) = \begin{cases} 3x^2 & 0 < X < 1 \\ 0 & o.w \end{cases}$

1-Find mode of  $g(y_1)$

2- Find  $g(y_1, y_4)$  (14 marks)

GOOD LUCK

  
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Lecturer

  
Ass. prof Dr. Bahaa A.Qassem  
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**\*Remark : Answer only seven questions ,for each question 10 mark**

Q1\ Define each of the following

- 1- Scientific Research Methodology
- 2- Research Problem
- 3- Previous Studies
- 4- Research Objective
- 5- Research Title

Q2\ Mention the steps that precede writing the research methodology

Q3: Enumerate the importance of sources and references

Q4: Mention the importance of citing sources and references

Q5: Enumerate the methods for writing previous studies

Q6: Mention the controls for drafting the questionnaire (five points)

Q7: Mention the most important basic conditions for research

Q8: Mention the steps for writing a research summary (five points only)

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Head of Dept.

**GOOD LUCK**

Ali .N. Hussein  
Lecturer





\*Remark : Answer ..... questions only

Q1/a) Write the normal equation for experiment contact by use RCD

Q1/ b) Let  $y_{ij} = \mu + t_i + \epsilon_{ij}$  prove that

$$\sum_{ij} [(y_{ij} - \bar{y}_{i.})(\bar{y}_{i.} - \bar{y}_{..})] = 0$$

Q2/a) in the R.C.B.D prove that

$$SS_T = SS_t + SS_B + SS_E$$

Q2/b)

- Show that for the  $2^4$  factorial the main effects and interactions represent a complete set of orthogonal contrasts among the 16 treatment combinations.
- Four different type of pollutants, for each pollutant four seeding of same age and high are available. Give the degrees of freedom for error

Q3/a) deferent type of drinks are injected into (3) grubs of animals; each grubs contented (6) animals. After period of time (4) blood samples are taken from each animal and analysis are made for each blood samples

- Give an appropriate linear models
- Kay out of anova table

Q3/b) Consider an experiment of  $2^3$  in blocks of size (4) . Give an estimate of the main effects (AC) if

- You have a system of complete confounded.
- You have a system of partial confounded.

Q4/

- Give the deferent between intra and enter blocks.
- Consider the linear model  $y_{ijk} = \mu + t_i + \beta_j + (\tau\beta)_{ij} + \epsilon_{ijk}$

$i = 0,1; j = 0,1; k = 1,2, \dots, 6$  where  $\tau_i \sim NID(0; \sigma_\tau^2)$  ;  $\beta_j \sim NID(0; \sigma_\beta^2)$  ;  $(\tau\beta)_{ij} \sim NID(0, \sigma_{\tau\beta}^2)$  ;  $\epsilon_{ijk} \sim N(0; \sigma^2)$  give the variance of  $y_{013}$

- for the  $2^n$  system in R.C.B.D Give  $E(SS(\hat{X}))$
- Consider a  $2^3$  exp. 4 blocks. Give an estimate of main effect





v. If you have the experimented have the anova table

a

S.O.V	d.f
treatment	3
error	0
Sampling error	12
total	15

b

S.O.V	d.f
treatment	3
error	12
Sampling error	0
total	15

c

S.O.V	d.f
treatment	3
error	4
Sampling error	8
total	15

Give which experiment you prevent and why?

Q5/  $2^2$  factorial in 3 replicate with 2 blocks per replicate

$b_1$	(1) ab	$b_1$	a ab	$b_1$	b ab
$b_2$	a b	$b_2$	(1) b	$b_2$	(1) a
	Rep I		Rep II		Rep III

Use of intra- and interblock information to solve the following

- i. The variance of main and interaction effect in each replicate
- ii. Key out of anova given sources of variation, degree of freedom, ss and MSE


Q6/ Give the analysis of variance table for  $2^4$  factorial in block of size  $2^2$  replicate 6 times

Q7/ Consider a  $2^3$  factorial experiment in CRBD with (5) blocks

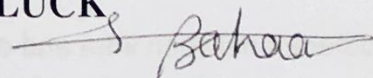
- i- define in terms of the true treatments effects, the main effect and the two and three factors interactions
- ii- Suppose each experiment unit has 3 observational. Give an expression on the variance of the estimator, for the main effects and interactions

Q8/ if you have the system of partial confounded

I	II	III	IV
(1) a	(1) b	(1) b	(1) a
ab b	ac c	bc c	ab b
c ac	b ab	a ab	ac c
abc bc	abc bc	abc ac	bc abc

  
 Ali Naser  
 Lecturer

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 Ass. prof Dr. Bahaa A. Qassem  
 Head of Dept.





**\*Remark : Answer only five questions, for each question (14) degrees**

**Q1\ A: Correct the following statements.**

1. A generalized inverse of a symmetric matrix is not necessarily symmetric.
2. If  $G = \begin{pmatrix} u \\ v \end{pmatrix}$  is  $N_{p+q}(\mu, \Sigma)$ , then u and v are independent when  $\Sigma_{uv} = 0$
3. If A and B are  $n \times n$  or if A and B are  $p \times n$  respectively, when x is an eigenvector of AB, then Bx is an eigenvector of BA.
4. Let A is  $n \times p$  matrix. Then  $A'A$   $p \times p$  is and its elements are products of the columns of A.
5. That orthogonality is not sufficient for minimizing variances and maximizing power.

**B: If y is distributed as  $N_p(\mu, \Sigma)$ , its moment generating function is given by  $M_y(t) = e^{t'\mu + t'\Sigma t/2}$**

**Q2\ A: Choose the correct answer to fill in the following blanks.**

1. If the side conditions are used only to obtain estimates and are not imposed on the parameters, then  $\alpha_1$  is ..... , and does not estimate a parameter according to  
 a. not square      b. not unique      c. not symmetric
2. If  $\beta_1 \neq 0$ , then  $E(SSR/k) > \sigma^2$  since  $X_c'X_c$  is positive definite, and we expect F to ..... 1.  
 a. near      b. equal      c. exceed
3. When A is  $n \times p$ , and x is  $p \times 1$ , and c is  $n \times 1$ , in which x and c are of different sizes. If  $n > p$  so that A has ..... rows than columns, then  $Ax=c$  typically has no solution.  
 a. more      b. fewer      c. equal
4. If is  $\hat{r}_{yz}$  ..... to  $r_{yz}$ , the contribution of z is less than  $r_{yz}^2$ .  
 a. far      b. close      c. symmetric
5. In the case of nonnormal variables that exhibit a curved trend, sij may give a very ..... indication of the relationship.  
 a. Clear      b. Misleading      c. faded

**B: If  $\mu_y = \begin{pmatrix} 1 \\ 2 \\ 3 \\ -2 \end{pmatrix}$ ,  $\Sigma = \begin{bmatrix} 4 & 2 & -1 & 2 \\ 2 & 6 & 3 & -2 \\ -1 & 3 & 5 & -4 \\ 2 & -2 & -4 & 4 \end{bmatrix}$ , Find value  $\text{var}(y_1/y_2, y_3, y_4)$**

**Q3\ Choose the correct answer with clarification when choosing:**

1. If  $\varepsilon \sim N(0, \sigma^2 I)$ , and  $E(\varepsilon_i^4) = 3\sigma^4$  for the linear model  $Y = X\beta + \varepsilon$ , then  $S^2$  is the best (minimum variance) quadratic  $\sigma^2$ , then

- a.  $\text{var}(\hat{\sigma}^2) = \frac{3\sigma^4}{n-p}$       b.  $\text{var}(\hat{\sigma}^2) = \frac{4\sigma^4}{n-p}$       c.  $\text{var}(\hat{\sigma}^2) = \frac{2\sigma^4}{n-p}$       d. Not from the above





2. We can compare  $\hat{\beta}_{(i)}$  to  $\hat{\beta}$  by means of Cook's distance, defined as

a.  $D = (\hat{\beta}_{(i)} - \hat{\beta})' h_{ii} / (k+1)$

b.  $D = (\hat{\beta}_{(i)} - \hat{\beta})' (h_{ii} / (1-h_{ii}))$

c.  $D = (\hat{\beta}_{(i)} - \hat{\beta})' (1-h_{ii} / (k+1))$

d. Not from the above

3. If the full model  $y = X\beta + \varepsilon$  and the reduced model  $y = X_1\beta_1^* + \varepsilon^*$  then

a.  $\text{var}(x'_0, \hat{\beta}) > \text{var}(x'_0, \hat{\beta}_1^*)$     b.  $\text{var}(x'_0, \hat{\beta}) \leq \text{var}(x'_0, \hat{\beta}_1^*)$     c.  $\text{var}(x'_0, \hat{\beta}) = \text{var}(x'_0, \hat{\beta}_1^*)$     d. Not from the above

4. If A is  $n \times p$  and B is  $p \times m$ , then  $(AB)'$  equals

a.  $A'B'$

b.  $B'A'$

c.  $AB'$

d. Not from the above

Q4\ Prove that  $\hat{\beta}_i = -\frac{\hat{\varepsilon}_i}{1-h_{ii}}(X'X)^{-1}x_i$ ?

Q5\ The sample covariance matrix of the residual vector  $y_i - \hat{y}_i(x)$  is equivalent to  $S_{yy} - S_{yx}S_{xx}^{-1}S_{xy}$ , that is,  $S_{y-\hat{y}} = S_{yy} - S_{yx}S_{xx}^{-1}S_{xy}$ ?

Q6\ If X is  $n \times (k+1)$  of rank  $k+1 < n$ , and if the first column of X is j, then the elements  $h_{ij}$  of  $H = X(X'X)^{-1}X'$  find the value of  $h_{ij}$ ?

GOOD LUCK

Prof. Dr. Sahar H. Zain  
 Lecturer

Ass. prof Dr. Bahaa A. Qassem  
 Head of Dept.





**Note : answer only five question , 14 marks for any question**

**Q1:** if you have following distance matrix

$$\begin{pmatrix} 0 & 3 & 7 & 11 \\ & 0 & 6 & 10 \\ & & 0 & 5 \\ & & & 0 \end{pmatrix}$$

Use the cluster analysis method to make the clusters from the matrix above and draw the clusters

**Q2:** for two variable normal dist. Is specified by

$$f(x) = b e^{-\frac{Q}{2}}$$

Where  $Q = 3y_1^2 + 2y_2^2 - 2y_1y_2 - 32y_1 + 4y_2 + 92$

Answer the question by choosing coerced answer

1. The mean vector is

a.  $\begin{pmatrix} 6 \\ 2 \end{pmatrix}$

b.  $\begin{pmatrix} 5 \\ 4 \end{pmatrix}$

c.  $\begin{pmatrix} -3 \\ 6 \end{pmatrix}$

2. The var-cov matrix is

a.  $\begin{pmatrix} \frac{3}{5} & \frac{1}{5} \\ \frac{1}{5} & \frac{6}{5} \end{pmatrix}$

b.  $\begin{pmatrix} \frac{2}{3} & \frac{-1}{3} \\ \frac{-1}{3} & \frac{3}{3} \end{pmatrix}$

c.  $\begin{pmatrix} \frac{2}{5} & \frac{1}{5} \\ \frac{1}{5} & \frac{3}{5} \end{pmatrix}$

3. The value of b is

a.  $1/2.54$

b.  $1/2.811$

c.  $1/3.54$

**Q3:** by using MLE method estimate the Mean and variance of a Multivariate Normal Distribution



Q4: suppose we have random sample of size  $n=26$  form MVN with 4 variable

$$X \sim MVN(\mu, \Sigma)$$

the var- cov matrix is

$$\begin{bmatrix} 9 & 1 & -1 & 0 \\ 1 & 10 & 2 & 1 \\ -1 & 2 & 7 & 0 \\ 0 & 1 & 0 & 6 \end{bmatrix}$$

1. Find  $\rho_{12.34}$
2. Test the hypothesis  $H_0: \rho_{12.34} = 0$  with signifivant level 0.05

Q5: suppose we have the following data

									$\Sigma$
X	103	102	102	75	69	65	61	53	630
Y1	24.7	14.2	8.6	27	24.3	17	43	27	185.8
Y2	11.6	7.6	7.1	13	19	14	21	17	110.3

$$\sum X^2 = 52558 \quad \sum Y_1 X = 13730.4$$

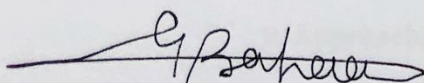
Find the regression coefficients

Q6: Bartlett employed the yield of gain and stow in an agriculture field trial the eight randomized block .the treatments blocks and error sum of square and products matrices

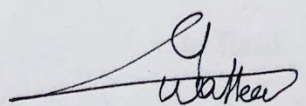
$$E = \begin{pmatrix} 136972.6 & 58549 \\ 58549 & 71496.1 \end{pmatrix} \quad H_t = \begin{pmatrix} 12496.5 & -6786.8 \\ -6786.8 & 32985 \end{pmatrix}$$

Test the hypothesis of equal treatment effect vector

With best wishes

  
Head of dept.

Dr. P.A. Bahar A. Qasim

  
Instructor

Dr. Waleed M. Rodeen





\*Remark : Answer only five questions, for each question (14) degrees

Q1: Correct the following statements.

1. The roots of this polynomial lie on the unit circle (thus it has a stationary solution).
2. The unconditional variance is unambiguously larger than the average conditional variance which reflects the extra variability introduced by the Autoregressive term.
3. An MA(q) model is only really suitable when we believe there is no correlation between two random variables separated by more than a certain distance.
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5. Quasi Maximum Likelihood estimator is the estimator Consists of when one likelihood is specified for the data they actually have a symmetrical distribution.
6. The conditional variance of the GARCH model is a weighted average of the squared returns, the weights decline with the lag, but never go completely to zero.
7. The average conditional variance reflects the extra variability introduced by the moving average term.

Q2\ A: Choose the correct answer to fill in the blanks the following.

1. ICs are often applied by estimating the largest model which is thought to correctly capture the dynamics and then dropping lags until the AIC or S/BIC fail to .....  
a. increase                      b. decrease                      c. constancy
2. Exponentially Weighted Moving Averages which place ..... weight on recent data than on past data weight  
a. greater                      b. Less                      c. equal
3. The causal time series has the .....correlation structure of a non-causal time series.  
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6. If MA(1) is be Autocorrelation Function  $\rho_1 \neq 0$  ,  $\rho_s = 0$ ,  $s > 1$  and Partial Autocorrelation Function is be.....  
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7. Over-differencing occurs when the difference operator is applied to a..... series.  
(a) nonstationary                      (b) stationary                      c. non-causal time series





Q3: Choose the correct answer with clarification when choosing.

1. The conditional variance for the autoregressive conditionally heteroskedastic is

- a.  $t\sigma_t^2$       b.  $a_0^2 + t\sigma_t^2$       c. 0      d. Not from the above

2. The optimal weights for a low-pass filter at particular frequency  $f$ , satisfy

- a.  $c_t = \sum_{i=k}^k (v_i - w_i)y_{t-i}$       b.  $c_t = \sum_{i=-k}^k (v_i - w_i)y_{t-i}$       c.  $c_t = \sum_{i=-k}^k (v_i - w_i)y_{t-k}$       d. Not from the above

3. The causal time series with the same covariance structure as  $X_t$  is  $\tilde{X}_t = (1/\phi)X_{t-1} + \varepsilon$  (which has backshift representation  $(1 - 1/(\phi B))X_t = \varepsilon_t$ ). Suppose we pass  $X_t$  through the causal filter, then  $\text{cov}(\tilde{\varepsilon}_t, \tilde{\varepsilon}_{t+r})$  equals

- a. 1      b. -1      c. 0      d. Not from the above

4. Describe the stages of data generation in a Markov Switching process

- a.  $\text{cov}(X_t, X_\tau) = \sum_{j=-\infty}^{\infty} a_j \varepsilon_{j+|t-\tau|} + \text{var}(\varepsilon_t)$       b.  $\text{cov}(X_t, X_\tau) = \sum_{j=0}^{\infty} a_j \rho_{j+|t-\tau|} + \text{var}(\varepsilon_t)$   
c.  $\text{cov}(X_t, X_\tau) = \sum_{j=-\infty}^{\infty} a_j \varepsilon_{j+|t-\tau|} + \text{var}(\varepsilon_t)$       d. Not from the above

Q4\ Given the covariances  $c(k)$  (with  $\sum_k |c(k)|^2 < \infty$ ), Find the spectral density to AR?

Q5: Suppose  $\Delta y_t$  follows an MA(3) so that  $\{y_t\}$  is an I(1) series which has both a permanent and transitive component. Since  $\{y_t\}$  is I(1),  $\Delta y_t$  must be I(0) and so can be described by a stationary ARMA(P,Q) process?

Q6: There are many solutions to Homogeneous Difference Equations, clear up that?

GOOD LUCK

Prof Dr. Sahira H. Zain

Lecturer

Ass. prof Dr. Bahaa A. Qassem

Head of Dept.





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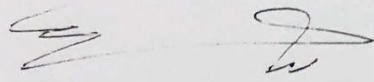
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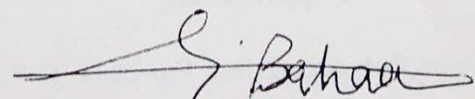
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GOOD LUCK

  
 Prof Dr. Sahira H. Zain  
 Lecturer

  
 Ass. prof Dr. Bahaa A. Qassem  
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\*Remark : Answer only five questions, for each question (14) degrees

Q1: Correct the following statements.

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