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Ministry of Higher Education  
& Scientific Research  
Al-Muthanna University  
College of Science  
Department of mathematics  
and computer applications



Subject :Multivariate analysis  
Stage :Fourth stage  
Date: / /2018  
Time : 3 hours

26.01.2018

45

((Assessment of the final exam for the first semester))

Academic year 2017 -2018

Note : 12 marks for each question(answer 5 only)

Q1:- By matrices find the regression equation  $Y/X$  that describes the relationship between  $X$  and  $Y$ , graph the regression line ?

|   |    |    |    |    |    |    |    |    |
|---|----|----|----|----|----|----|----|----|
| X | 6  | 9  | 3  | 8  | 7  | 5  | 8  | 10 |
| Y | 30 | 49 | 18 | 42 | 39 | 25 | 41 | 52 |

Q2:-For G.L.M.  $\underline{Y} = X\underline{\beta} + \underline{E}$  where  $\underline{\hat{\beta}}_{(O.L.S)}$ ,  $\underline{E} \sim N(0, \sigma^2 I_n)$

Show that  $Var(\underline{\hat{\beta}}_{(O.L.S)}) = \sigma^2 (X'X)^{-1}$

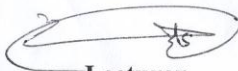
Q3:- If  $\underline{X} \sim N_p(\underline{M}, \Sigma)$  and  $\underline{Y} = C\underline{X}$ , show that  $\underline{Y} \sim N_p(C\underline{M}, C\underline{\Sigma}C')$

Q4:- If  $\underline{X} \sim N_3\left(\begin{bmatrix} 3 \\ -1 \\ 0 \end{bmatrix}, \begin{bmatrix} 2 & 0 & 3 \\ 0 & 1 & 0 \\ 3 & 0 & 5 \end{bmatrix}\right)$  where  $\underline{X}' = (\underline{X}'_1 \quad \underline{X}'_2)$ , and  $\underline{X}_1 = \begin{bmatrix} x_1 \\ x_3 \end{bmatrix}$

Find i) the p.d.f. of  $x_2$  ? ii) the regression function  $E(\underline{X}_1 / \underline{X}_2)$  ?

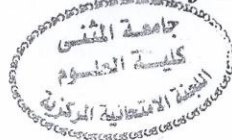
Q5:- Find the eigen values and eigen vectors for the matrix  $A = \begin{bmatrix} 4 & 2 \\ 1 & 3 \end{bmatrix}$

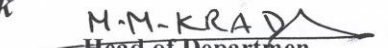
Q6:- If  $\underline{X} \sim N_2(\underline{M}, \Sigma)$  where  $Q(\underline{X}) = 2X_1^2 + 3X_2^2 - 2X_1X_2$ , Find  $K$  satisfies normalized the p.d.f.?



Lecturer  
ALAA H. SABRI

Best of luck



  
Head of Departmen  
Assist.prof. MOUSA M.KRADY



(( Final exam for the first semester ))  
2017 -2018

26. 01. 2018

45

**Remark\** Twelve marks for every question and six marks for every branch

Q1 \ Prove or disprove the following statements:

- (1) If  $A$  is a convex set in vector space  $V$  over  $F$  then  $A$  be a subspace of  $V$ .
- (2) Every normed space be a metric space.
- (3) The closed Ball in normed space  $X$  be a convex set.
- (4) If  $\{x_n\}$  is a Cauchy sequence then  $\{x_n\}$  be a bounded sequence in normed space  $X$ .

Q2\ A\ If  $A$  is a subset of vector space  $V$  over  $F$  then  $A$  is a convex set if  $f(\alpha + \beta)A = \alpha A + \beta A$  for all  $\alpha, \beta \in \mathbb{R}^+$ .

B\ Prove that every affine set which contains zero in vector space  $V$  over  $F$  be a subspace.

Q3\ Prove that every norms over finitely – dimensional vector space be equivalent.

Q4\ A\ If  $\{x_n\}$  and  $\{y_n\}$  are two sequence in normed space  $X$  such that  $x_n \rightarrow x$  and  $y_n \rightarrow y$  then:

(1)  $\frac{x_n}{y_n} \rightarrow \frac{x}{y}$ .

(2)  $x_n - y_n \rightarrow x - y$

B\ Let  $f : \mathbb{R} \rightarrow \mathbb{R}$  such that  $f(x) = x$  for all  $x \in \mathbb{R}$ . Does  $f$  be continuous function.

Q5\ Let  $f : X \rightarrow Y$  is a linear transformation and let  $A \subset X$  and  $B \subset Y$  then :

- (1)  $A$  is a convex set in  $X$  then  $f(A)$  be a convex set in  $Y$ .
- (2) If  $B$  is a subspace in  $Y$  then  $f^{-1}(B)$  be a subspace in  $X$ .



Best luck

Lecturer  
Zainab Hayder

Head of Department  
Asst.prof Mousa Makey



((Assessment of the final exam for the first semester))

20. 01. 2018

45

Academic year 2017 -2018

Q1/ Discuss the continuity of  $f(z) = \begin{cases} z^2 & ; z \neq i \\ 0 & ; z = i \end{cases}$ , at  $z_0 = i$

Q2/ Let  $f(z)$  be analytic function for each  $z$ , prove that:  $\nabla^2 |f(z)|^2 = 4|f'(z)|^2$ .

Q3/ Define the zeros and singularities of a complex function  $f(z)$ , and prove that the zeros of  $\sin z$  and  $\cos z$  in complex plane are the same as the zeros in real plane.

Q4/ Let  $f(z) = u(x, y) + iv(x, y)$ , deduce Cauchy – Riemann conditions in polar form, and then show that  $f'(z) = \frac{1}{z} \left[ \frac{\partial v}{\partial \theta} - i \frac{\partial u}{\partial \theta} \right]$ .

Q5/ Define a branch and principal value of  $z^c$  and find its derivative.

B/ Let  $z_1 = 1 - i$ ,  $z_2 = -1 - i$ , show that  $P.V. (z_1 z_2)^i \neq (P.V. z_1^i)(P.V. z_2^i)$

Q6/ Evaluate the magnitude of  $w = \sin z$  at the point  $z = \pi + i \ln(2 + \sqrt{5})$

Q7/ Why is the function  $\sinh(e^z)$  entire? Write its real part as a function of  $x$  and  $y$ , and state why that function must be harmonic everywhere.

Q8/ A/By definition of limits find  $\lim_{z \rightarrow 1-i} [x + i(2x + y)]$

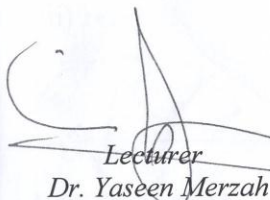
B/ Show that  $f(z) = e^{-\theta} \cos(\ln r) + i e^{-\theta} \sin(\ln r)$ ;  $r > 0$ ;  $0 < \theta < 2\pi$  is differentiable and find  $f'(z)$ .

Q9/ Find  $\cos^{-1} z$ , then  $\cos^{-1} i$ .

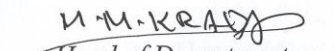
Q10/ Let the function  $f(z) = u(x, y) + i v(x, y)$  be analytic in some domain  $D$ . State why the functions  $U(x, y) = e^{u(x, y)} \cos v(x, y)$ ,  $V(x, y) = e^{u(x, y)} \sin v(x, y)$  are harmonic in  $D$  and why  $V(x, y)$  is a harmonic conjugate of  $U(x, y)$ .

**note: 6 marks for each question**

**Good Luck**

  
Lecturer  
Dr. Yaseen Merzah



  
Head of Department  
Asst. Prof. Mousa M. Krad





78. 01. 2018

((Assessment of the final exam for the first semester))

Academic year 2017 - 2018

45

Note : 6 M for every equation

- 1) What is (Unit- Step – Function)? Find Laplace transform of the function  $u(t-a)$  ?
- 2) Find Laplace transform of  $f(t)$  , where  $f(t) = \sin^2 t \cos^3 t$  ?
- 3) State and prove ((theorem of Change of measurement ))?
- 4) Find the inverse of Laplace transform of the following :

a)  $F(s) = \frac{2s+3}{s^2+4s+20}$  ? ,      b)  $F(s) = \frac{e^{-2s}}{(s+3)^2}$  ?

- 5) Defined the Fourier Cosine and Sine transform and the inverse ? and solve the following P.D.E.  $\frac{\partial u}{\partial y} - q \frac{\partial^2 u}{\partial x^2} = 0$  ? with initial condition  $u(x,0) = 0$  and  $u_x(0,y) = f(y)$  ?

- 6) Solve the following integral equation

$f(t) = a \sin t + 2 \int_0^t f'(\tau) \sin(t-\tau) d\tau$  ,  $f(0) = 0$  ?

- 7) Sketch the (Saw –tooth – function )? Defined  $f(t)$  of this function ? is the function a periodic ?why? Find the Laplace transform of this function ?

- 8) Solve by using Laplace transform the following P.D.E.

$\frac{\partial^2 u}{\partial y^2} - \frac{\partial^2 u}{\partial x^2} = 0$ ,  $0 < x < 1$  , where

$u(0,y) = u(1,y) = 0$ ,  $u(x,0) = \sin \pi x$ ,  $u_y(x,0) = -\frac{1}{2} \sin \pi x [\cos(0) + 1]$ ,  $0 < x < 1$  ?

- 9)A) Prove that  $\mathfrak{I}\{f(x-a)\} = e^{-ika} \mathfrak{I}\{f(x)\}$  ?

- B)If  $f(x)$  piecewise continuously deff. And absolutely integrable , then

i)  $F(k)$  is bounded for  $-\infty < k < \infty$  ?

ii)  $F(k)$  is continuous for  $-\infty < k < \infty$  ?

- 10) Find the convolution ( choose three only )

i)  $t * e^{at}$

ii)  $\sin at * \sin at$

iii)  $t * t * t$

iv)  $\cos t * e^{2t}$

Lecturer

RAFID H. BUTI

Good Luck

Head of Department

MUSA M. KRADY

المرحلة / الرابعة  
المادة / اللغة العربية  
التاريخ / /  
الوقت / ثلاث ساعات



وزارة التعليم العالي والبحث العلمي  
جامعة المنيا  
كلية العلوم  
قسم الرياضيات ورياضيات  
الحاسوب

16. 07. 2017

اسئلة الامتحان النهائي للفصل الدراسي الأول السنة الدراسية ٢٠١٧-٢٠١٨

ملاحظة تسلم ورقة الأسئلة مع دفتر الاجابة .

س١/ اجب عن احد الفرعين:

١- اذكر فقط ما تدل عليه علامات الترقيم وفي أي موضع تستخدم :١- (؟) ٢- (...) ٣- [ ] ٤- (-) (-

١٢ درجة)

٥- ( ) ( ) .

١٢ درجة)

٢- ماهي علامات الرفع عددها مع الأمثلة؟

١٢ درجة)

س٢/ عرف الفعل الماضي ثم اذكر متى يبني على الفتح مع الأمثلة؟

س٣ استخرج الأسماء من النصوص الآتية وبين نوعها ثم اذكر حركاتها وعلاماتها الإعرابية.

١- قال تعالى: ﴿ الشَّمْسُ وَالْقَمَرُ بِحُسْبَانٍ ﴾ .

٢- قال تعالى: ﴿ وَمَا تَلْكَ يَمِينِكَ يَا مُوسَى ﴾ .

٣- قال الشاعر:

الحمد للوجع حمداً واضح النسب  
إن كان أيقظكم يا معشر العرب

١٢ درجة)

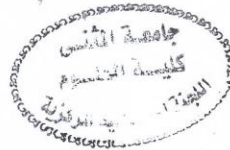
٤- ومرّ بتذكارات عهدٍ محببٍ

١٢ درجة)

س٤/ ما هي علامات الجزم اذكر ذلك مع الأمثلة المضبوطة بالشكل مع الحركات الإعرابية؟.

١٢ درجة)

س٥/ عرف علامات الترقيم ثم عدد خمس منها مع موضع استعمالها؟



رئيس القسم

مدرس المادة  
د. راجح عبد الله





Note: For each question 12 marks.

Q<sub>1</sub>: Define and give example:

- 1- Indiscrete Topology.
- 2- Base.
- 3- Limit point.
- 4- Dense set.
- 5-Relative Topology.
- 6- Homeomorphism Function.

Q<sub>2</sub>: Let  $A = \{0, 1, \frac{1}{2}, \frac{1}{3}, \dots\} \subseteq \mathbb{R}$ . Find  $A^\circ, \bar{A}, A'$  in

- 1- Usual topology.
- 2- Discrete topology.
- 3- Indiscrete topology.
- 4- Cofinite topology.

Q<sub>3</sub>: Answer the following with examples :(Only Three)

- 1- What the relation between topology and relative topology?
- 2- What the relation between base and subbase?
- 3- What the relation between open and closed map?
- 4- What the relation between finite and infinite product space?

Q<sub>4</sub>: 1- Let  $X$  be a nonempty set. Find the induced topology from the following metric  $d$  on .

$$d(x, y) = \begin{cases} 1 & \text{if } x \neq y \\ 0 & \text{if } x = y \end{cases}$$

- 2- Is topological space has more than one base? Is the converse is true? Explain with example.
- 3- Let  $T$  be a class consisting of  $\mathbb{R}, \emptyset$  and all infinite open intervals  $(q, \infty)$ ,  $q \in \mathbb{Q}$ , then prove  $T$  is not topology on  $\mathbb{R}$ .

Q<sub>5</sub>: a- Consider the topology  $T = \{X, \emptyset, \{a\}, \{b, c\}\}$  on  $X = \{a, b, c\}$  and the topology  $L = \{Y, \emptyset, \{u\}\}$  on  $Y = \{u, v\}$ . Find the defining base  $\beta$  for the product topology on  $X \times Y$ .

b- Let  $X$  be a nonempty set and  $\beta$  is family of subsets of  $X$ . Then  $\beta$  is base for topology  $T$  on  $X$  iff:

- 1-  $X = \bigcup_{B \in \beta} B$ .
- 2-  $\forall B_1, B_2 \in \beta$ , then  $B_1 \cap B_2$  is union elements of  $\beta$ .

رئيس القسم  
أ.م. موسى مكي كريدي

GOOD LUCK



م.د. عامر حمزه علي  
مدرس المادة