(٤٥) ريام عبد الامير

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 $\hat{\underline{\beta}}_{(O.L.S)}$, $\underline{E} \sim N(\underline{0}, \sigma^2 I_n)$

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

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

Q4:- If $\underline{X} \sim N_3(\begin{bmatrix} 3 \\ -1 \\ 0 \end{bmatrix} , \begin{bmatrix} 2 & 0 & 3 \\ 0 & 1 & 0 \\ 3 & 0 & 5 \end{bmatrix})$ 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 $Q(X) = 2X_1^2 + 3X_2^2 - 2X_1X_2$,Find K satisfies normalized the p.d.f.?

Best of luck

Lecturer
ALAA H. SABRI

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M.M.-KRADY
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Assist.prof. MOUSA M.KRADY

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Ministry of Higher Education
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Muthanna University
College of Science
Department of mathematic
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computer applications

Subject: Functional analysis I
Stage: 4th
Date: / /2017
Time :3hours

((Final exam for the first semester)) 24. 01. 2018
2017 -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 $\alpha, \beta \in R^+$.
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 $x_n \to x$ and $y_n \to y$ then:
(1) $\frac{x_n}{y_n} \to \frac{x}{y}$.
(2) $x_n - y_n \to x - y$
B\ Let $f : R \to R$ such that $f(x) = x$ for all $x \in R$. Does f be continuous function.

Q5\ Let $f : X \to Y$ 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.

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Best luck

Lecturer
Zainab Hayder

M.M.KRADA
Head of Department
Asst.prof Mousa Makey

Ministry of Higher Education
& Scientific Research
Al-Muthanna University
College of Science
Department of Mathematics
and Computer Applications

Subject: Complex analysis I
Stage: 4^{th} stage
Date: / / 2018
Time : 3 hours

20. 01. 2018

45

((Assessment of the final exam for the first semester))
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 $sinz$ and $cosz$ in complex plain are the same as the zeros in real plane.

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

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 $w = sinz$ at the point $z = \pi + iln(2 + \sqrt{5})$

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 $\lim_{z\to 1-i}[x + i(2x + y)]$

B/ Show that $f(z) = e^{-\theta}\cos(lnr) + i\, e^{-\theta}\sin(lnr)$; $r > 0$; $0 < \theta < 2\pi$ 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 $U(x, y)$.

<u>note: 6 marks for each question</u>

Good Luck

Lecturer
Dr. Yaseen Merzah

M.M.KRADY
Head of Department
Asst. Prof. Mousa M. Krady

Ministry of Higher Education
& Scientific Research
Al-Muthanna University
College of Science

18. 01. 2018

Subject: Integral transformations.
Stage: 4th year
Date: / /2018
Time : 3 hour
Dept.:Math&Computer Applications

45

((Assessment of the final exam for the first semester))
Academic year 2017 - 2018

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 $\Im\{f(x-a)\}=e^{-ika}\Im\{f(x)\}$?
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**

وزارة التعليم العالي والبحث العلمي
جامعة المثنى
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المرحلة / الرابعة
المادة / اللغة العربية
التأريخ / / / ٢٠١٨
الوقت / ثلاث ساعات

16. 01. 2018

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-(– –) ٥-(﴿ ﴾) . (١٢ درجة)

٢-ماهي علامات الرفع عددها مع الامثلة؟ (١٢ درجة)

س٢/ عرف الفعل الماضي ثم اذكر متى يبنى على الفتح مع الامثلة؟ (١٢ درجة)

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

١-قال تعالى: ﴿ الشَّمْسُ وَالْقَمَرُ بِحُسْبَانٍ ﴾.

٢-قال تعالى: ﴿وَمَا تِلْكَ بِيَمِينِكَ يَا مُوسَى ﴾.

٣-قال الشاعر:

الحمد للجوعِ حمداً واضحَ النسبِ إن كان أيقظكم يا معشرَ العربِ

٤- ومرَّ بتذكاراتِ عهدٍ محببٍ (١٢ درجة)

س٤/ما هيْ علامات الجزم اذكر ذلك مع الأمثلة المضبوطة بالشكل مع الحركات الإعرابية؟. (١٢ درجة)

س٥/ عرف علامات الترقيم ثم عدد خمس منها مع موضع استعمالها؟ (١٢ درجة)

رئيس القسم

مدرس المادة
د. رياض عبدالله

Ministry of Higher Education
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Al-Muthanna University
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Subject: Topology
Stage: Fourth
Date: / /2018
Time : 3 hr

14. 01. 2018

45

((Assessment of the final exam for the First semester))
Academic year 2017-2018

Note: For each question 12 marks.

Q_1: Define and give example:

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

Q_2: 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_3: 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_4:1- Let X be a nonempty set. Find the induced topology from the following metric d on .

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

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,∞), $q \in Q$, then prove T is not topology on $\mathbb{R}$.

Q_5: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 β for the product topology on $X \times Y$.

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

1- $X = \cup_{B\in\beta}\, \beta$.

2- $\forall B_1, B_2 \in \beta$, then $B_1 \cap B_2$ is union elements of β.

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مدرس الماده
م.د.عامر حمزه علي

GOOD LUCK