جامعة كفر الشيخ

كلية العلوم

قسم الرياضيات

المادة: ديناميكا تحليليه

الفرقة: الثالثة

الزمن: ساعتين

التاريخ: ٢٠١٨-١-١٧

Answer the following quations

Q(1)

(a) Find the components of velocity and acceleration of a point in cylindrical polar Coordinates.

(b) A spherical pendulum is started horizontally at the level of the center. Prove that the equations of motion in azimuth and depth are

(i) $\left(l^2 - z^2\right)\dot{\phi} = Vl$ (ii) $l^2 \dot{z}^2 = z\left[2g\left(l^2 - z^2\right) - V^2 z\right]$

Q(2)

(a) Find the components of velocity and acceleration for the motion of a particle on A twisted curve.

(b) A particle of mass m is projected horizontally under gravity with velocity V from a point on the inner surface of a smooth sphere of radius a at an angle distance α from the lowest point find the pressure on the surface when it is at an angular distance θ from the lowest point.

Q(3)

(a) Find the angular momentum of rigid body about a fixed point

(b) Find the equations of motion of a rigid body in three dimensions

Q(4)

Discuss the motion of a sphere on a rough plane under the action of forces the resultant of which passes through the center of the sphere

مع خالص تمنياتي لكم بالتوفيق والنجاح

جامعة كفر الشيخ - كلية العلوم قسم الرياضيات الفرقة : الثالثه الشعبه : رياضيات المادة : توبولوجي		الاختبار النهائي الفصل الاول ٢٠١٧-٢٠١٨م التاريخ: ٢٤ / ١٢ / ٢٠١٧م الدرجه : ٧٠ درجه الزمن : ١٠-١٢

Solve the following questions:

Question (1) (18 Marks)

Let τ be the class of subsets of N consisting of φ and all subsets of N of the form

$E_n = \{n, n+1, n+2, \ldots\ldots\ldots\}$ with $n \in N$.

(i) Show that τ is a topology on N, (ii) list the open sets containing the positive integer 7.

(ii) Find the family of closed subsets of (N, τ).

Question (2). (18 Marks)

a- If (X, D) is a discrete topological space and A is a subset of X, find A'.

b- If (X, τ) is a topological space and A, B are subsets of X, prove that $(A \cap B)^{\circ} = A^{\circ} \cap B^{\circ}$.

c- Show that a constant function is continuous.

Question (3) (17 Marks)

a- If $X = \{a, b, c\}$ and β is a family of subsets on X such that $\beta = \{\{a, b\}, \{b, c\}\}$, is β a base for any topology on X.

b- Prove that a mapping $f : (X, \tau) \to (Y, \sigma)$ is continuous if and only if $f^{-1}(A^{\circ}) \subseteq (f^{-1}(A))^{\circ}$, for any $A \subseteq Y$.

Question (4) (17 Marks)

a- If (X, τ) is a topological space and A is a subset of X, prove that $\bar{A} = A^{b} \cup A^{\circ}$.

b- Prove that the intersection of two neighbourhoods of a point is also a neighbourhood of it.

End Questions

Best regards

Prof. Dr. Ahmed EL-Maghrabi

س (3) (أ) أوجد قيمة التكامل $\int_{c} \frac{zdz}{(z-4)^2(z^2+16)}$ باستخدام نظرية كوشي ونظرية الباقي في الحالات التالية:

(ب)

$(1)C:|z-4i|=1$ .... $(2)C:|z+4i|=1$

$(3)C:|z-4|=1$ .... $(4)C:|z|=1$ ..... $(5)C:|Z|=6$

س (3) (أ) برهن نظرية لورانت.

(ب)أوجد متسلسلة لورانت التي تمثل الدالة $f(z)=\frac{1}{(5-z)(z-6)}$ في المجالات الاتية:

$(1)...5<|z|<6$ .... $(2)..|z|<5$ .... $(3)...|z-6|<1$

جامعة كفر الشيخ
كلية العلوم
قسم الرياضيات   امتحان الفصل الدراسي الأول للعام
2017--------2018 م

الفرقة: المستوي الثالث(رياضيات)
المادة: تحليل مركب (1) (ر320)
الزمن: ساعتان
التاريخ: الاربعاء 27/ 12/ 2017

اجب عن الأسئلة الآتية :

س (1) (أ) أوجد جذور المعادلة: $Z^5 = -1 + \sqrt{3}i$

(ب) أدرس نقاط اتصال الدالة التالية:

$$f(z) = \begin{cases} \dfrac{z^3 + i}{z - i} & , z \neq i \\ -6 & , z = i \end{cases}$$

(ج) عرف الدالة التحليلية $f(z)$ **عند نقطة** $z_\circ$.

(د) باستخدام معادلتي كوشي ريمان أي من الدوال تحليلية:

$$(1)\ f(z) = \frac{z}{z + (1 + 2i)} \qquad (2)\ f(z) = ze^{2Z}$$

(2) (أ) إذا كانت $f(z) = u(x,y) + iv(x,y)$ **وكانت المشتقات الجزئية** u_x, u_y, v_x, v_y

موجودة ومتصلة عند $Z_\circ$ **فبرهن أن الدالة** $f(z)$ **قابلة للاشتقاق عند** $z_\circ$ **والمشتقة**

$$f'(z_\circ) = u_x(x_\circ, y_\circ) + iv_x(x_\circ, y_\circ)$$

(ب) اذا كانت $f(z)$ **تحليلية علي منطقة مترابطة D تحتوي علي منحني C مغلق بسيط موجب الاتجاه و w نقطة داخل C فبرهن ان**

$$\int_C \frac{f(s)ds}{(s - w)} = 2\pi i f(w) \ldots\ldots, \notin C$$

بقية الأسئلة بالخلف

(10 Marks)

Question2

By the graph method find the optimal solution of the following (LPP):-

$$Max \ \ z = 2x_1 + 3x_2$$
$$s.t. \quad x_1 + x_2 \le 4 \, , \quad 6x_1 + 2x_2 \ge 8 \, , \quad x_1 + 5x_2 \ge 4$$
$$x_1 \le 3 \quad , \qquad x_2 \le 3$$
$$and \quad x_1, x_2 \ge 0$$

(20 Marks)

Question3

Find the optimal solution of the following (LPP) and its duality

$$Min \quad f(x) = 20 \ x_1 + 16 \ x_2$$
$$s.t. \quad x_1 \ge 2.5 \, , \qquad x_2 \ge 6$$
$$2x_1 + x_2 \ge 17 \quad , \qquad x_1 + x_2 \ge 12$$
$$and \qquad x_1, x_2 \ge 0$$

With Best Wishes **Dr. Amin Elfeky**

Kafrelsheikh University Faculty of Science Mathematics Department Final Exam of First Term 2017-2018	Linear Programming M319	Level : 3^{rd} year mathematics Date : 31\12 \2017 Time Allowed : 2H Total Marks :100 (70 Written, 10 Oral,20 Exercises) Exam in two Pages

Answer the following questions

Question1 **(40 Marks)**

1- - State all types of duality linear programming problems ?

2- Prove that the intersection of any number of convex sets is also convex set?

3- Show that whether the following function is convex or concave :-

$$f(x) = x^2 + 2x$$

4- Prove that the dual of the dual is the primal ?

5- find the dual linear programming problem of the following :-

$$Min \; Z = x_1 + 4x_2 - 2x_3 - x_4$$

$$s.t. \quad x_1 - 3x_2 + x_3 - x_4 \le 2 \,, \quad -x_1 + x_2 - 2x_3 = 3 \,,$$

$$x_1 + 2x_2 - 3x_4 \ge 5 \quad , \quad -3x_2 - 2x_3 + x_4 \le 6$$

And $x_1, x_3 \ge 0$, x_2, x_4 unrestricted variables

$\Rightarrow$ *Look Page 2*

Kafrelsheikh University Faculty of Science Mathematics Department Final Exam of First Term 2017-2018	Numerical Analysis (1) M321	Level : 3^{rd} year mathematics Date : 3 \ 1 \2018 Time Allowed : 2H Total Marks :100 (70 Written, 10 Oral,20 Exercises) Exam in one Page

Answer the following questions

(15 Marks)

Question1

Make use the following data, to estimate $f''(2)$

X	0	1	3	4
Y	-3	-5	9	25

(25 Marks)

Question2

(15 Marks)

1- Prove that

$$i)\quad \Delta^n f_{p-n} = \delta^n f_{p-\frac{n}{2}} \quad , \quad ii)\quad \nabla = -\frac{1}{2}\delta^2 + \delta\sqrt{1+\frac{1}{4}\delta^2}$$

2- - If $f(x) = u(x).v(x)$, show that,

$$f[x_0, x_1] = u(x_0).v[x_0, x_1] + u[x_0, x_1].v(x_1)$$ (10 Marks)

(35 Marks)

Question3

(20 Marks)

1- Solve the following problem by two different methods :-

$$y' = x + y^2, \quad y(1) = -1 \quad , h = 0.1 , \quad in \quad [1,2]$$

(15 Marks)

…mpute the following

$$\int_1^4 \int_0^2 \frac{1}{(x+y)^2}\,dxdy \qquad , n_x = 2 \ , n_y = 3$$

…find the error.

With Best Wishes Dr. Amin Elfeky

KafrElsheikh University
Faculty of Science
Third level

Time: 2h
Subject: Introduction of Probability and Statistics
3 / 1 / 2018

Answer the following question

(1) (a) For any two events A, B prove that

$$p(A \cup B) = P(A) + P(B) - P(A \cap B)$$

(b) let A and B be events with $p(A) = \frac{1}{2}$, $P(B) = \frac{1}{8}$, $P(A \cap B) = \frac{1}{4}$ find

(i) $p(A \backslash B)$ (ii) $p(B \backslash A)$ (iii) $p(A \cup B)$ (iv) $p(A^c \backslash B^c$

(2) Given the probability density function

$$f(x) = \begin{cases} \frac{1}{6}x + k & 0 \le x \le 3, \\ 0 & elsewhere \end{cases}$$

(i) What is the value of k
(ii) What is the cumulative distribution function of x
(iii) Compute $p(1 \le x \le 2)$, $p(x \le 3)$

(3)Team A has probability $\frac{2}{5}$ of winning whenever it plays. If A plays 4 games, find the probability that A wins

(i) 2 games (ii) at least one game (iii) more than half of the games.

(4) let x be a random variable with the standard normal distribution, find

(i) $p(0 \le x \le 1.42)$ (ii) $p(-0.73 \le x \le 0)$

(iii) $p(-1.37 \le x \le 22.01)$ (iv) $p(x \ge 1.13)$.

(5) from the tables find mean, variance and standard deviation

class	2-8	9-15	16-22	23-29	30-36
f	5	8	6	3	2

BEST WISHES
DR. NAGWA YOUNS

Kafr Elsheikh University
Faculty of Science
Department Mathematics
Third level

Time: 2h
Subject: Probability Theory (1)
14 / 1 / 2018

Answer the following question

(1) Given the joint density function

$$f(x,y) = \begin{cases} \dfrac{e^{-\frac{x}{y}}}{y} & 0 < x < \infty, \quad 0 < y < \infty \\ 0 & elsewhere \end{cases}$$

(i) Find the marginal densities g(x), h(x)

(ii) Find the conditional density f(x\y)

(iii) Find E(x\y)

(iv) Evaluate p (1<x<2 \y=3)

(2) Suppose that X and Y has the following joint probability function:

X	-3	2	4	Sum
1	0.1	0.2	0.2	0.5
3	0.3	0.1	0.1	0.5
sum	0.4	0.3	0.3	

(i) Find the marginal distributions of x and y

(ii) Find cov (x,y)

(iii) Find Correlation coefficient between X and Y

(iv) Are x and y independent random variables?

(3) Let x and y are two independent random variables and let z be their sum. Find
(i) PMF of z when x and y are Binomial random variables.
(ii) PMF of z when x and y are Poisson random variables.

(4)Let x and y are independent and let w = x+y,

$f_x(x) = \lambda e^{-\lambda x} \quad , x \geq 0 ,$

$f_y(y) = \lambda^2 y e^{-\lambda y} \quad , y \geq 0$

Find PMF of w and C.D.F.

BEST WISHES
DR. NAGWA YOUNS

٣ رياضيات

جامعة كفر الشيخ-كلية العلوم قسم الرياضيات الفرقة : الثالثه (نبات - حيوان) المادة : رياضيات حيويه رمز المقرر : MATH 202		الاختبار النهائي الفصل الاول ٢٠١٧ - ٢٠١٨م اليوم : الاحد ٢٠١٨/١/١٤م الزمن : ١٠-١٢ الدرجة : ٧٠ درجه

Solve the following questions:

Question (1) (18 Marks)

a- Is the system of the linear equations a unique or infinite solution or no solution by Determinants: $-3y+2x+5z=3,\quad 4x-y+z=1,\quad 3x-2y+3z=4$.

b- Find the final velocity of a car which is the initially going at $20\,m/s$ and then accelerates at a rate of $a=5\,m/s^2$ for a period of 15 seconds.

c- If the following values represented the length of eight students by centimeters:

173,175,168,164,172,167,170,165. Find the median and the variance.

Question (2) (18 Marks)

a-Derive the equation of the line passing through the point $(-2,3)$ and perpendicular to the line $2x-3y+6=0$.

b- By graphical method solve the simultaneous equations: $y-x^2=0,\quad y+0.5x=1.5$.

c- A bacterial population initially with $N_0=5.2\times10^5$ cells per m L is decaying exponentially according to the equation $N_t=N_0\,e^{kt}$ and it is found that after $t=2$ hours the population has become $N_2=3.5\times10^4$ cells per m L, calculate the value of k in the equation.

Question (3) (17 Marks)

a-Calculate the growth factor g, if (i) a population increase by 15% every ten years,

(ii) a bacterial population decrease by 25% every hour.

b-If $N_t=N_0\,e^{-k(t-t_0)}$, where N_t is the population at the time t, N_0 is the population at the time $t=0$, e is the fundamental exponential, k is the rate of growth of the population, find the value of t

Question (4) (17 Marks)

a- If $N_t=N_0\,e^{kt}$, where N_t is the population at the time t, N_0 is the population at the time $t=0$, e is the fundamental exponential, k is the rate of growth of the population and t is the time. Drive the linearization equation and hence find the slope and the intercept.

b- Find the area of the circle with the center at $(-4,2)$ and tangent to the line $3x+4y-16=0$.

End Questions

Best regards

Prof. Dr. Ahmed EL-Maghrabi