



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

Academic year 2017 -2018

45

ملاحظة :- لكل سؤال 12 درجة

السؤال الأول:- معمل يقوم بإنتاج 3 نوع من المنتجات A,B,C حيث كان سعر بيع المنتج A =150 دينار للوحدة الواحدة وسعر بيع B =200 دينار للوحدة الواحدة وسعر بيع C=250 دينار للوحدة الواحدة وكانت كلف إنتاج الوحدة الواحدة لهذه الأنواع هي A=20 و B=40 و C=60 دينار والجدول التالي يوضح كمية المواد الأولية التي تحتاجها المنتجات

المطلوب وصف هذه المشكلة بأنموذج برمجة خطية؟

المنتجات →	A	B	C	الطاقة الاستيعابية
المواد الأولية ↓				
I	2	3	10	40
II	4	8	12	80
III	6	10	14	100
الوقت	1.5	1	3	16

الاسئلة تخص طرائق البرمجة

$$MaxZ = 50X_1 + 40X_2$$

S.to

$$6X_1 + 3X_2 \leq 54$$

$$4X_1 + 5X_2 \leq 60$$

$$X_1, X_2 \geq 0$$

السؤال الثاني :- إذا كان لدينا مسألة البرمجة الخطية الآتية :-

$$\begin{bmatrix} 5/18 & -1/6 \\ -2/9 & 1/3 \end{bmatrix}$$

وأن المصفوفة تحت الاحادية هي

أكتب جدول الحل الامثل ؟

السؤال الثالث :- لمسألة البرمجة الخطية حدد الحالة الخاصة إن وجدت باستعمال واحدة فقط من الطرائق الآتية

$$MaxZ = 3X_1 + 2X_2$$

1-طريقة M

S.to

$$2X_1 + X_2 \leq 2$$

$$2X_1 + 4X_2 \geq 12$$

$$X_1, X_2 \geq 0$$

2-طريقة المرحلتين



ينبع

السؤال الرابع :- أوجد الحل الأمثل للمسألة الآتية

Dest.→	1	2	3	Supply
Sources↓				
1	0.7	0.9	0.8	3
2	0.3	0.4	0.6	5
Demand	5	2	1	

السؤال الخامس :- للمشروع التالي تم تقدير ثلاثة أوقات لكل نشاط أوجد المسار الحرج ووقت الانجاز

Act.	A=2,5,8	B=6,9,12	C=5,14,17	D=5,8,11	E=3,6,9	F=3,12,21	G=1,4,7
And Expected times							
Pre.Act.	-	A	A	B	C,D	-	E,F



Best of luck

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28 05. 2018

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03.06.2018

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Q1// A// Define the following terms :

arc , simple arc , simple closed curve , simple connected domain , positively oriented , differentiable arc .

B// Evaluate the integrals $\int_C \frac{e^{-z} dz}{z - \frac{\pi i}{2}}$, $\int_C \frac{\cosh z}{z^2} dz$; where c is the square $x = \pm 2$, $y = \pm 2$

***** (12 marks)

Q2// Use residues to evaluate the definite integral $\int_{-\pi}^{\pi} \frac{d\theta}{1 + \sin^2 \theta}$

***** (6 marks)

Q3// Prove that by using contour integral $\int_0^{\infty} \frac{\cos(ax) - \cos(bx)}{x^2} dx = \frac{\pi}{2} (b - a)$; $a \geq 0, b \geq 0$,

Then with $1 - \cos(2x) = 2\sin^2 x$ show that $\int_0^{\infty} \frac{\sin^2 x}{x^2} dx = \frac{\pi}{2}$.

***** (6 marks)

Q4// State and prove Cauchy- Coursat theorem, and give an example.

***** (6 marks)

Q5// Determine the image of the first quadrant of z plane mapped by the transformation $w = z^2$.

***** (6 marks)

Q6// Show that by using contour integral $\int_0^{\infty} \frac{x^{p-1}}{1+x} dx = \frac{\pi}{\sin(p\pi)}$; $0 < p < 1$

***** (6 marks)

Q7// Compute $\oint_C \frac{e^z dz}{(z-1)(z+3)^2}$; where C is given by a) $|z| = 2$, b) $|z| = 5$

***** (6 marks)

Q8//A// Expand $f(z) = \frac{z}{(z+1)(z-2)}$ in Laurent series valid for $0 < |z - 2| < 3$

B// Write the principal part of the function at its isolated singular point and determine whether that point is a pole, a removable singular point, or an essential singular point:

$$f(z) = \frac{1}{(2-z)^3} \quad , \quad f(z) = \frac{\cos z}{z}$$

***** (12 marks)

Good Luck



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11.06.2018

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Notes
Remark Twelve marks for every equations

Q1\ Prove or disprove the following statements:

- (1) If x and y two vectors in **pre Hilbert space** X , then $\|x+y\|^2 = \|x\|^2 + 2\operatorname{Re}\langle x, y \rangle + \|y\|^2$.
- (2) If $\{x_n\}$ is sequence in normed space X and for all $x \in X$ s.t $x_n \rightarrow x$, then $x_n \xrightarrow{w} x$.
- (3) If X is **Hilbert space** over field F and $T, S \in B(X)$, then $(S \circ T)^* = T^* \circ S^*$.
- (4) If $f: X \rightarrow Y$ is an one to one linear transformation then $\ker(f) = \{0\}$.

Q2\ A\ If $f: X \rightarrow Y$ is a linear transformation then f is bounded iff f is continuous.

B\ If x and y two vectors in **pre Hilbert space** X , then $\langle x, y \rangle = \frac{1}{4} [\|x+y\|^2 - \|x-y\|^2 + i\|x+iy\|^2 - i\|x-iy\|^2]$.

Q3\ State and prove Cauchy -Schwarz inequality.

Q4\ A\ Let X be **Hilbert space** and let $\psi: X \rightarrow X^*$ be defined by $\psi(y) = f_y$ s.t $f_y(x) = \langle x, y \rangle$ for all $x \in X$. Does ψ bijective, associative, and linear transformation.

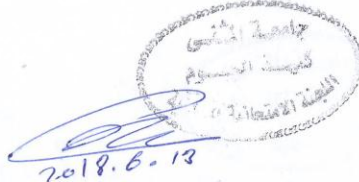
B\ If $f: X \rightarrow F$ is a nonzero linear functional over normed space X then f is continuous iff $\ker(f)$ is closed set.

Q5\ A\ Let X be ^a vector space over field F and let $P: X \rightarrow X$ be a linear transformation then P be a projection over X iff $1-P$ is projection over X .

B\ Give an example **with it is solution** for normed space and the same time be **pre-Hilbert space**.

Best Luck

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Note: For each question 12 marks

Q1: Give example for the following:

- 1- Separable is not second space. 2- Set is not compact. 3- T_1 -space is not T_2 -space.
4- First is not second space.

Q2: In usual topological space (R, T_u) , answer the following:

- 1- Is $[0,1]$ is compact set in R ? Why? 3- Is $[0,1]$ is path in R ? Why?
2- Is $[0,1]$ is connected set in R ? Why? 4- Is $[0,1]$ is arcwise in R ? Why?

Q3: Let X be a topological space. Then prove the following are equivalent:

- i- X is normal space.
ii- If H is an open and F is closed such that $F \subseteq H$ then there exist open set G such that
 $F \subseteq G \subseteq \bar{G} \subseteq H$.

Q4: In (R, T_u) , (Q, T_Q) is relative topology then

- 1- What the difference between the sets $Q \cap [\sqrt{-2}, \sqrt{2}]$ and $Q \cap (\sqrt{-2}, \sqrt{2})$.
2- Use this difference to show the relative topology (Q, T_Q) is not connected.

Q5: Consider the following subsets of real plane R^2

$$A = \{(x, y) : 0 \leq x \leq 1, y = x\}$$

$$B = \{(x, 0) : \frac{1}{4} \leq x \leq 1\}$$

Determine with graph:

- 1- Arcwise connected 2- Separated 3- Connected

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Good Luck

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2018-6-18

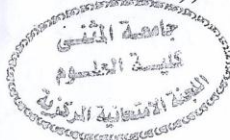


Note // 6 Marks For Every Equation

- 1) By using polar coordinates , show that $B(m,n) = \frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$ ^{where} $m,n > 0$?
- 2) Solve by using Frobenius method the following D.E. $xy'' - y' - xy = 0$?
- 3) Defined Bessel equation of order ν ? and find solution of Bessel equation of the first kind of order ν ?
- 4) Find the $\frac{d}{dx}(x^{-n}J_n(x))$? And find $\int x^3 J_3(x) dx$?
- 5) Defined Euler D.E. ? And solve the following D.E. $x^2 y'' - xy' + y = 0$?
- 6) What is Legendre equation ? and the general formula for Legendre function? find $P_3(x)$?
- 7) For each Fixed $n = 0,1,2,\dots$, the Bessel functions $J_n(\lambda_{1n}x), J_n(\lambda_{2n}x), \dots$. form an orthogonal set on the interval $0 \leq x \leq R$ with respect to the weight function $P(x) = x$, i.e
 $\int_0^R x J_n(\lambda_{mn}x) J_n(\lambda_{kn}x) dx = 0, (k \neq n)$. And the norm $\|J_n(\lambda_{mn}x)\|^2 = \int_0^R x J_n^2(\lambda_{mn}x) dx = \frac{R^2}{2} J_{n+1}^2(\lambda_{mn}x)$?
- 8) Prove that $\int_{-1}^1 p_n^2(x) dx = \frac{2}{2n+1}$?
- 9) What is the generating function of the Hermite polynomial ? And show that $H_n(x) = (-1)^n \exp(x^2) \frac{d^n}{dx^n} (\exp(-x^2))$?
- 10) ((Choose one only))
- 1) What is the difference between hypergeometric function and confluent hypergeometric function?
- 2) Show that $\frac{\sqrt{\pi}}{2x} \operatorname{erf}(x) = {}_1F_2\left(\frac{1}{2}, \frac{3}{2}, -x^2\right)$?

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((Good Luck))



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