El-Mansoura- Egypt	second term 2014.	المنصورة – مصر
Mansoura University	Program: 4th year.	جامعة المنصورة
2 hours in 3/06/2014	(Statistics and Computer Science & Mathematics)	كلية العلوم ٢٠١٤/٦
Faculty of Science	Subject: Graph Theory	
Mathematics Department	Course Code: 412	قسم الرياضيات

Answer the following questions: **Mark**

1- a- (i) Find all simple disconnected graphs with 4 vertices.   5

     ii) Find all simple connected graphs with 4 vertices.

   b- Find a simple graph with 3 components , 10 vertices having: 5

    (i) - maximal number of edges.   (ii) minimal number of edges.

   c- Find an example of a bipartite connected graph with $2n$ vertices and having: 5

    (i) Maximal number of edges.   (ii) Minimal number of edges.

   d- Find an example of a simple connected graph with   5

    $2n$ vertices and no triangles having :

    (i) maximum number of edges.   (ii) minimum number of edges.

2- a- Prove that if G is a connected graph without circuits,   5

    then G has a vertex of degree 1.

   b- Find two nonisomorphic graphs with 5 vertices and 4 edges.   5

   c- Find the number of edges of a regular graph of order 1 and $2n$ vertices.   5

   d- Prove that the fewest number of edges of a connected graph with   5

    n vertices is n-1 edges.

3 - a- Prove that if v is a vertex of the complete graph K_n, then $K_n - v$ 10

    is the complete graph K_{n-1}. And show that K_n is not bipartite for each $n \geqslant 3$

   b- Mention and prove Euler formula for planar graphs.   10

    And then prove that K_5 is not planar.

4- a- Give the definition of maximal planar graph G. And show that   7

    $m \leqslant 3n - 6$ for each planar graph with n vertices and m edges.

   b- Prove that a graph G is regular of order 2 if and only if   7

    each component of G is a cycle.

   c- Prove or disprove that if there is an open walk between v_0 and v_n 6

    in a graph G, then there is a path between them.   ----------

                                          full mark   80

Good luck. Dr. Magdi H. Armanious

Final Exam
Computer Graphics – Math 443
4th Level
Mathematics Department
Faculty of Sciences
Mansoura University
7th June 2014
Exam Duration: 2 Hours
Questions in 1 Page – Marks: 60
Answer ALL the Questions

Question One .... **(20 Marks)**

Given the following Video Game Description, answer the following questions:
Video Games are becoming a dominant field in Computer Science that almost everyone nowadays is enjoying. Racing Flights is considered one of the most well-known video games in the world. If you have been assigned designing and developing such a game.

1. Identify the basic Models your video game will include.
2. Identify the basic interactions in your video game.
3. What are the characteristics you are going to provide in video game interface?

Question Two .... **(40 Marks)**

1. What is Interactive Computer Graphics? Give with illustration an example.
2. Illustrate with figure the Conceptual Graphics Framework.
3. What are the main components of Graphics Library? Give some examples of well known ones.
4. Compare between Modeling and Rendering.
5. What is the difference between: Image Editing and Image Processing?
6. Compare between Sample based Graphics, and Geometry based Graphics.
7. Discuss the Hardware Revolution that enabled Modern Computer Graphics.
8. Discuss Software Improvements that enabled Modern Computer Graphics.
9. Discuss Environmental Evolution that enabled Modern Computer Graphics.
10. What is Computer Graphics?
11. Define Hardware Evolution that enabled Modern Computer Graphics.
12. Compare between Raster and Vector Display.
13. Compare between the Brown's Old Cave and New Cave Design.
14. In Sample based Graphics: How we do sampling? What are the advantages and disadvantages of this technique?
15. Compare between "Immediate Mode" and "Retained Mode" in Computer Graphics.

Best wishes,
Dr.Haitham A. El-Ghareeb

Answer the following questions:

[1] a- Let $X_t = A\,Cos\,(\theta\,t) + B\,Sin\,(\theta\,t)$, where A and B are two uncorrelated

random variables with zero means and unit variances with $\theta \in [-\pi\,,\,\pi]$, show that

the time series $\{X_t\}$ is stationary   (10 marks)

b-Consider the MA(1) process given by $X_t = Z_t + \theta\,Z_{t-1}$, where $\{Z_t\} \sim WN(0\,,\,\sigma^2)$

i) Show that if $|\theta| < 1$ the process can be represented as $Z_t = \sum_{j=0}^{\infty}(-\theta)^j\,X_{t-j}$ (10 marks)

ii) Show that $|\rho(1)| \le \dfrac{1}{2}$ (10 marks)

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[2] a- Find the coefficients ψ_j , $j = 0\,,1\,,2\,,\ldots$ in the representation $X_t = \sum_{j=0}^{\infty}\psi_j\,Z_{t-j}$

of the causal ARMA (1 , 1) process and use them to compute $\gamma(h)$ (20 marks)

b-For each of the following models, classify it as an ARMA (p , q) process, and

determine whether it is causal and / or invertible   (10 marks)

i) $X_t = Z_t - 1.3\,Z_{t-1} + 0.4\,Z_{t-2}$

ii) $X_t - 0.4\,X_{t-1} - 0.45\,X_{t-2} = Z_t + Z_{t-1} + 0.25\,Z_{t-2}$

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[3]a- Prove that the Process $X_t = X_{t-1} + Z_t$ where $\{Z_t\} \sim WN(0\,,\,\sigma^2)$, is not

stationary process .   (10 marks)

b- Define the operators ∇ and ∇_d , explain how they can be used to remove

the trend and seasonality from the time series $\{X_t\}$, $t \in Z$ (10 marks)

Best wishes Dr. Faten Shiha

المقرر: تحليل التباين (ر ٤٣٤)	2_nd term	Mansoura university
الزمن : ساعتان	2013/2014	Faculty of science
التاريخ : ٢٠١٤/٥/٣١	4th year (stat., computer sci.) Final exam	Math. Depart

Answer the following questions

Q1: (27 marks)

For the observations in the following table

treatments	observations					
A	4	7	6	3		
B	7	8	6	6	5	4
C	5	6	7			

(a) Test the hypothesis that $H_0 : \mu_1 = \mu_2 = \mu_3$ at level of significance $\alpha = 0.05$ where
$f_{0.05}(2,10) = 4.10$

(b) Use Bartlett's test to test the homogeneity of variances at level of significance $\alpha = 0.01$ where
$b_3(0.01,4) = 0.3165$, $b_3(0.01,6) = 0.5149$, $b_3(0.01,3) = 0.1672$

Q2: (26 marks)

Suppose that we are interested in the yields of 3 varieties A, B and C of wheat using 4 different fertilizers, planted in 12 randomly selected pieces of land with the same fertility assumption, production was, as in the following table. The yields for the 3 varieties of wheat measured in 100 kg

Wheat	Fertilizers			
	I	II	III	IV
A	70	56	51	61
B	66	60	55	60
C	77	67	59	65

(a) Are there any differences between the impact of different types of fertilizers
(b) Are there any differences between the productions of different types of wheat?
[Use $\alpha = 0.05$ and $f_{0.05}(2,6) = 5.14$, $f_{0.05}(3,6) = 4.76$].

Q3: 27 marks)

Four different education methods A, B, C and D are used for teaching the subject of mathematics to 24 students in primary school , the following table shows the marks for these students in the final exam of mathematics

Methods	Marks					
A	7	10	9	8	10	10
B	5	6	4	8	7	6
C	8	9	10	6	3	6
D	5	6	4	3	7	5

(a) With probability 95% test that education methods have the same effect, where
$f_{0.05}(3,20) = 3.10$

(b) Use Cochran's test to test the hypothesis $H_0 : \sigma_1^2 = \sigma_2^2 = \sigma_3^2 = \sigma_4^2$.
[Use $\alpha = 0.05$ and $g_{0.05}(4,6) = 0.5895$].