	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF MATHEMATICS
	EXAMINATION FOR PROSPECTIVE STUDENTS (.... YEAR) STUDENTS OF STATISTICS
COURSE TITLE: probability 2	COURSE CODE: ST3121

DATE:10-1-2017	JAN,...	TERM:FIRST	TOTAL ASSESSMENT MARKS:150	TIME ALLOWED: 2 HOURS

Answer the following questions(each question of 15 marks):

1- Let the joint p.d.f of the discrete r.v's X and Y be:

$$p(x,y)=\frac{\lambda^{x+y}}{x!\,y!}e^{-2\lambda} \;,\; x=0,1,2,\ldots \quad and \quad y=0,1,2,\ldots$$

prove that r.v's X and Y are independent.

2- Suppose that the joint p.d.f of the r.v's X and Y is given by :

$$f(x,y)=4y(x-y)e^{-x-y} \;,\; 0\le x\le\infty \;,\; 0\le y\le x$$

Compute the conditional variance $Var(x|y)$.

3- Let the joint density function of X and Y given by :

$$f(x,y)=k\,x\,y^2 \qquad , \quad 0<x<y<1$$

What is the value of the constant k ?

4- If the moment generating function of the random variables X and Y is :

$$M(s,t)=e^{(s+3t+2s^2+18t^2+12st)}$$

what is the covariance of X and Y?

5- If the r.v's X and Y have $\mu_x=2, \mu_y=-3, \mu_z=4, \sigma_x^2=1, \sigma_y^2=5, \sigma_z^2=2, \text{cov}(x,y)=-2$, $\text{cov}(x,z)=-1$ *and* $\text{cov}(y,z)=-1$, find mean and variance of $W=4X-Y+2Z$.

6- Find the p.d.f of the sum of independent r.v's $X_1, X_2, \ldots, X_n$ which having Poisson distributions with respective parameters $\lambda_1, \lambda_2, \ldots, \lambda_n$.

7- Let the joint density function of X and Y be given by :

$$f(x,y)=2 \quad \text{if} \quad , \quad 0<x<y<1$$

find the correlation coefficient $\rho(x,y)$.

8- Suppose that the r.v X has standard normal distribution. Drive the p.d.f of the r.v $Z=X^2$.

9- Prove that the r.v $Y=\dfrac{X-np}{\sqrt{npq}}$, where X follows the binomial distribution with parameters n and p tends to standard normal distribution when $n\to\infty$.

10- Prove that the random variables X and Y are independent if and only if

$$M(t_1,t_2)=M(t_1)\times M(t_2) .$$

EXAMINERS	PROF. DR./	DR/ ADEL EDRESS
	DR/	DR/

With my best wishes

إحصاء + رياضيات

TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF MATHEMATICS			
EXAMINATION FOR STATISTIC (FOURITH YEAR) STUDENTS			
COURSE TITLE:	OPERATION RES. (1)		COURSE CODE: MA3103
DATE: 28/12/2016	TERM: SECOND	TOTAL ASSESS. MARKS: 150	TIME ALLOWED: 2 H.

ANSWER THE FOLLOWING QUSETION:

[1] Find the set of all vertices and determine graphically the optimal solution of the following Linear Program:

(35 deg.)

$$LP\begin{cases} \max \quad z = -x_1 + 2x_2 \\ \text{s.t.} \quad x_1 + 2x_2 \le 30, \qquad 2x_1 + x_2 \le 20, \\ \quad -5x_1 + 1.5)x_2 \le 15, \qquad x_1, x_2 \ge 0 \end{cases}$$

[2] By simplex method solve of linear program:

(40 deg.)

$$(\text{LP}):\begin{cases} \min z = -5x_1 - 8x_2 - 10x_3 \\ \text{s.t.} \quad x_1 + 2x_2 + 2x_3 \ge 120, \\ -3x_1 + 2x_2 + x_3 \le -90, \\ 2x_1 + 4x_2 + 2x_3 \le 100, \\ x_1, x_2, x_3 \ge 0 \end{cases}$$

[3] By simplex method solve of following dual linear program:

(35 deg.)

$$(\mathbf{D}):\begin{cases} \min w = 120x_1 - 90x_2 + 100x_3 \\ \text{s.t.} \quad x_1 - 3x_2 + 2x_3 \ge 5, \\ x_1 + 2x_2 + 4x_3 \ge 8, \\ 2x_1 + x_2 + 2x_3 \ge 10 \\ x_1, x_2, x_3 \ge 0 \end{cases}$$

[4] By northwest corner method and Vogel method solve of the transportation problem:

(40 deg.)

	Demand			
Supply	5	9	6	5
7	4	7	10	3
10	7	5	6	9
8	3	6	5	8

EXAMINERS	PROF. E. AMMAR	GOOD LOKE

احصاء + علوم حاسب + رياضيات

	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF MATHEMATICS				
	EXAMINATION FOR PROSPECTIVE STUDENTS (THIR D YEAR)				
	COURSE TITLE: NUMERICAL ANALYSIS			COURSE CODE: MA 3103	
DATE: 29 -12 - 2016	JANUARY 2016- 2017	TERM: FIRST	TOTAL ASSESSMENT MARKS: 150	TIME ALLOWED: 2 HOURS	

Answer the following questions:

1. **Graphically, find a real root for the nonlinear equation:** $x\log_{10} x = 1$: (22 M)
2. **Find the cubic polynomial which takes the following values:** $f(0)=1,\ f(1)=0,\ f(2)=1,\ f(3)=10$, **then find** $f(0.5)$. (20 M.)
3. **Prove that: i)** $\Delta = E\nabla$, **ii)** $\Delta^3(3e^x) = 3(e^{x+3h} - 3e^{x+2h} + 3e^{x+h} - e^x)$. (20 M.)
4. **By the inverse matrix method, solve the following linear system:**

$$3x_1 + x_2 + 2x_3 = 3,$$
$$2x_1 - 3x_2 - x_3 = -3,$$
$$x_1 + 2x_2 + x_3 = 4.$$
(22 M)

5. **Find** $f'(0.5), f''(0.5)$ *and* $f'''(0.5)$ **from the data:** $f(1)=2, f(0)=-1$ *and* $f(3)=14$, **for the function** $f(x)$. (22 M.)
6. **Evaluate the integral** $\int_0^1 \frac{2x}{x^2+1}dx$, **using Trapezoidal rule, with** $n=8$. (22 M.)
7. **Solve, using Picard's method, the initial value problem:** $y'' - y = 0,\ y(0) = y'(0) = 1$. (22M.)

EXAMINERS	PROF. DR./ A. EL-NAMOURY	PROF DR/ A. A. HEMEDA
	DR/	DR/

With my best wishes

Mathematics Department , Faculty of Science ,Tanta University		
Branch: Math. Dept.		Sub-branch : Statistics
Examination for : Level three		Term: first Term 2016-2017
Course Title: Design and Analysis of Algorithms		Course Code:CS3103
Date: 14/1/2017	Total Mark: 100 marks	Time Allowed: 2 Hours

Answer the following questions:

Question 1 (25 marks):

a) Define: θ-notation, O-notation, Ω-notation, o-notation, ω-notation. **(10 marks)**

b) Show that the sum of the first n positive integers is $\theta(n^2)$. **(10 marks)**

c) Show that the polynomial $f(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x + a_0$ is $O(x^n)$, where $a_0,\ a_1, \ldots, a_{n-1},\ a_n$ are real numbers. **(5 marks)**

Question 2 (20 marks):

a) Define the ***recurrence*** and then using recursion-tree method to find a good guess for the recurrence $T(n) = 3T(\lfloor n/4 \rfloor) + \theta(n^2)$. **(10 marks)**

b) State master theorem and use it to get the order of growth in following :

(i) $T(n) = T(2n/3) + 1$. **(5 marks)** (ii) $T(n) = 3T(n/4) + n \lg n$. **(5 marks)**

Question 3 (30 marks- each item 5marks):

Define the ***algorithm*** and then compare between the Insertion and Merge algorithms in terms of: (i) Problems which are solve. (ii) efficiency.
(iii) method of construction. (iv) pseudocode.
(v) running time in best case and in worst case. (vi) order of growth.

Question 4 (25 marks):

a) Complete the following sentences: **(5 marks)**

(i) A function $f(n)$ is monotonically increasing if ....implies.................

(ii) Any exponential function with a base strictly greater than 1 grows ....than any polynomial function.

(iii) Loop invariant is a property or condition that is true .... and .... each iteration of a loop.

b) Mark true or false, justify your answer:

(i) $f(n^2) = O(n)$ and $f(n) = 3n^2 + 8n \log n = \theta(n^2)$. **(8 marks)**

(ii) The input size has the same definition in difference problems. **(4 marks)**

(iii) The running time depends on the input size and the input case. So we have three cases to get running time. **(4 marks)**

(v) Every correct algorithm is an efficient. **(4 marks)**

with our Best Wishes

Examiners	أ.د/السعيد ابراهيم عمار
	د/ إيمان غـريب رزق

TANTA UNIVERSITY
FACULTY OF SCIENCE
DEPARTMENT OF MATHEMATICS

EXAMINATION FOR (THIRD YEAR) STUDENTS OF STATISTICS			
COURSE CODE:ST3105	Inventory System		COURSE TITLE:
TIME ALLOWED: 2 HOURS	TOTAL ASSESSMENT MARKS: 150	TERM: 1	23 -1- 2017

1-a – Define the inventory cycle. Evaluate the optimal order quantities for the modified penalty inventory model. (25 mark)

-b- Determine the minimum total cost for an inventory system when the replenishment occurs uniformly, no shortages are allowed and the production rate is greater than the demand rate. Also determine the sensitivity of this model. (25 mark)

2- a- Determine the optimal order quantity for the single period uniform demand multi-item probabilistic inventory model. (25 mark)

-b- Calculate the minimum total cost when the stock is reviewed continuously, the shortages are allowed , an order of size Q per cycle is placed every time the stock-level reaches a certain reorder point R and the demand during lead time is random variable follows the uniform distribution over (0,a) (25 mark)

3-a-Determine the optimal order quantity for the discrete probabilistic inventory model. (25 mark)

-b-. For SISS inventory model , by using a geometric programming approach. Determine optimal order quantity for the following :

$TC = OC + HC + PC$ Subject to: $OC \le k_1$, $HC \le k_2$ (25 mark)

أطيب الأماني بالتوفيق والنجـاح،،

	EXAMINERS
Dr. Hala Ali Fergany Dr. Neama Salha	

TANTA UNIVERSITY
FACULTY OF SCIENCE
DEPARTMENT OF MATHEMATICS

EXAMINATION FOR (THIRD YEAR) STUDENTS OF STATISTICS			
COURSE CODE:ST3105	Inventory System		COURSE TITLE:
TIME ALLOWED: 2 HOURS	TOTAL ASSESSMENT MARKS: 150	TERM: 1	23 -1- 2017

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$TC = OC + HC + PC$ **Subject to:** $OC \le k_1$, $HC \le k_2$ **(25 mark)**

أطيب الأماني بالتوفيق والنجاح،،

	EXAMINERS
Dr. Hala Ali Fergany Dr. Neama Salha	

احصاء

TANTA UNIVERSITY - FACULTY OF SCIENCE - MATHEMATICS DEPARTMENT	
EXAMINATION FOR THIRD LEVEL (STATISTICS)	
COURSE TITLE: **Design of Experiments (ST3103)**	TIME ALLOWED: **2 Hours**
DATE: **16th January 2017** — TERM: **First** — TOTAL ASSESSMENT MARKS: **150**	

Answer the following questions: (*consider $\alpha = 0.05$ in all questions*)

1- We have five different machines making the same pins and we take five random samples from each machine to obtain the following pins diameter data:

M1	M2	M3	M4	M5
0.125	0.118	0.123	0.126	0.118
0.127	0.122	0.125	0.128	0.129
0.125	0.120	0.125	0.126	0.127
0.126	0.124	0.124	0.127	0.120
0.128	0.119	0.126	0.129	0.121

Test if there are any differences in pins diameters.

2- An experiment was conducted to investigate the effects of three different diets on the growth of rats. There were five different litters of rats used in the experiments. From each litter, one rat was assigned to each of the three diets. The weights gains over a fortnight's period are summarized in the table below.

		Diet A	Diet B	Diet C
Litter	1	1.58	1.47	1.27
	2	1.54	1.61	1.48
	3	1.50	1.31	1.25
	4	1.42	1.50	1.07
	5	1.52	1.67	1.59

Determine whether there are significant difference (i) between the litters (ii) between the diets.

3- The maximum output voltage of a particular type of storage battery is thought to be influenced by the material used in the plates and the temperature in the location at which the battery is installed. Four blocks of the experiment are run in the laboratory for three materials (M) and two temperature (T), and the results are as below

Blocks	I	T_2M_2 (19)	T_2M_1 (34)	T_1M_1 (30)	T_2M_3 (44)	T_1M_3 (40)	T_1M_2 (26)
	II	T_2M_1 (24)	T_2M_2 (22)	T_2M_3 (20)	T_1M_2 (33)	T_1M_1 (45)	T_1M_3 (31)
	III	T_1M_2 (18)	T_1M_1 (23)	T_2M_1 (41)	T_1M_3 (30)	T_2M_3 (41)	T_2M_2 (34)
	IV	T_1M_3 (29)	T_2M_2 (15)	T_2M_3 (15)	T_2M_1 (75)	T_1M_2 (42)	T_1M_1 (70)

Analyze the previous data using a suitable design.

الاحصاء

1969	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF MATHEMATICS **Final Exam, 1st Term, 2016-2017**		
	3rd year, Statistics	**Course Title:** Correlation Theory(1)	**Course Code:** ST3101
	Date: 2-1-2017	**Total Mark:** 150 Marks	**Time Allowed:** 2 Hours

Answer all the following questions

Question 1 For the following data.

Age (years) of Husband	Age (years) of wife				
	10 - 20	20 -30	30 - 40	40 -50	50 - 60
15 - 25	5	3			
25 - 35		15	14		
35 - 45	3	11	11	7	
45 - 55			7	12	3
55 - 65				3	6

Calculate: correlation coefficient (r) - standard deviation of X (s_X) - standard error of X on Y ($s_{X.Y}$).

Question 2

(1) Show that the linear correlation coefficient is given by

$$r = \frac{N\,\Sigma\,XY - (\Sigma\,X)(\Sigma\,Y)}{\sqrt{[N\,\Sigma X^2 - (\Sigma\,X)^2][N\,\Sigma Y^2 - (\Sigma Y)^2]}}$$

(2) If the regression lines of Y on X is given by $Y = a_0 + a_1 X$, and of X on Y is given by $X = b_0 + b_1 Y$, prove that $a_1 b_1 = r^2$.

Question 3

(1) Show that the least-squares regression line of Y on X can be written as

$$y = \left(\frac{\Sigma\,xy}{\Sigma\,x^2}\right)x,$$

where $x = X - \bar{X}$ and $y = Y - \bar{Y}$.

(2) Explain the difference between the standard deviation of a variable Y and standard error of estimate of regression line of Y on X.

Question 4

(1) Prove the following relation

$$\frac{x_1}{s_1} = \left(\frac{r_{12} - r_{13}r_{23}}{1 - r_{23}^2}\right)\frac{x_2}{s_2} + \left(\frac{r_{13} - r_{12}r_{23}}{1 - r_{23}^2}\right)\frac{x_3}{s_3}$$

(2) Explain in brief tests of hypothesis for the population linear correlation coefficient.

Examiners:	**Dr.** *HASAN BAKOUSH* & **Dr.** *NEAMA TEMRAZ*