جامعـة المنصورة – كلية العلوم
قسـم الرياضيات
التـاريخ : 31 / 12 / 2015 م
الدرجة الكلية : 80 درجة

امتحـان دور يناير 2016 م
اسم المادة : نظرية احصائية (1)
الفرقة : الثالثة (احصاء وعلوم حاسب)
كود المادة : ر333

Answer the following questions:

Q1) Write short notes on the following : (20 Marks)

1) Maximum likelihood method   2) F- distribution   3) T- distribution

4) The sample distribution of the sample proportion

Q2) a- Prove that the sample variance $S^2 = \dfrac{1}{n-1} \sum\limits_{i=1}^{n} \left(X_i - \overline{X} \right)^2$ is unbiased estimator

for the population variance σ^2 . (10 Marks)

b- A sample of size 36 is drawn from a population with $\mu = 2.4$ and standard

deviation $\sigma = 1.2$. Find the Probability that the sample mean will be

i) more than 2.7   ii) less than 2.2 (10 Marks)

c- Prove that the sample mean $\overline{X}$ is a best unbiased estimator for the population

mean μ of a normal distribution (10 Marks)

Q3) a- Deduce a $(1-\alpha)100\%$ confidence interval for the difference between two

Population means $\mu_1 - \mu_2$ (15 Marks)

b- Find a 95 % confidence interval for the Population mean μ for the following

frequency table: (15 Marks)

Classes	2 -	4 -	6 -	8 -	10 -	12 − 14
Frequency	4	6	8	10	6	2

$P(0<Z<1) = 0.34$, $P(0<Z<1.5) = 0.43$, $\varphi(1) = 0.84$, $\varphi(1.5) = 0.93$

$Z_{0.025} = 1.96$, $Z_{0.005} = 2.58$

مع التمنيات بالنجاح د. محمد جاد

Final Exam- Semester I - Year 2015/2016

Answer the following questions

Question-1 (20 marks)

1. Define the algebra of sets, the outer measure on an algebra Ω, the measurable set and the measurable function

2. Prove that, if $\mu: \Omega \longrightarrow [0,\infty)$ and $A_n \in \Omega$, $n=1,2,\ldots$, then

$$\mu\left(\bigcup_{n=1}^{\infty} A_n\right) \le \sum_{n=1}^{\infty} \mu(A_n)$$

3. prove that, if A is countable set then $\mu^*(A) = 0$

Question-2 (20 marks)

1. Prove that, if E_1 and E_2 are measurable sets then $E_1 \cap E_2$ is a measurable set

2. Show that the interval $]a,\infty[$ is measurable

3. Prove that the cantor set is measurable and find its measure

Question-3 (18 marks)

1. Show that the following statements are equivalent
   a) for each real number α the set $\{x : f(x) > \alpha\}$ is measurable
   b) for each real number α the set $\{x : f(x) \le \alpha\}$ is measurable

2. Prove that if f and g are measurable sets on [a,b] and $f_2 \ne 0$ then the functions $|f|$, $f.g$ and $\dfrac{f}{g}$ are also measurable

Question-4 (22 marks)

1. Evaluate $\int_0^5 f(x)dx$, if $f(x) = \begin{cases} 0, & 0 \le x < 1 \\ 1, & \{1 \le x < 2\} \cup \{3 \le x < 4\} \\ 2, & \{2 \le x < 3\} \cup \{4 \le x < 5\} \end{cases}$

   by using Riemann and Lebesgue definitions of the integral

2. Show that the function

$$f(x) = \begin{cases} 1, & x \text{ is a rational number in} [0,1] \\ 0, & x \text{ is an irrational number in} [0,1] \end{cases}$$

   a) Is not Riemann integrable in [0,1]
   b) Is Lebesgue integrable in [0,1] and find the value of Lebesgue integral of f(x) in [0,1]

Mansoura University
Faculty of Science
Mathematics Department
Statistics and Computer Science

Network Programming
Term Exam
Mon: 11th Jan, 2016
Dr. Bahaa Shabana

Answer the following 5 (five) questions.

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1. Question #1:

Define briefly each of the following:-

1.1. DHCP.	1.5. MAC.
1.2. Host.	1.6. Node.
1.3. Intranet.	1.7. Port.
1.4. IPv4.	1.8. Protocol.

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2. Question #2

2.1. Simplify the address FEDC:0000:0000:0000:0090:A8C0:0000:1700

2.2. Write the corresponding mixed mode for address
FEDC:52A0::A8C0:1020:0

2.3. What is NAT? Draw a sketch showing functionality of NAT.

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3. Question #3

Write an example that counts the number of times a particular character, such as 'e' appears in a file. The character can be specified at the command line. You can use "Xanadu.txt" as the input file.

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4. Question #4

4.1. What is the usage of the class inetAddress? Write the statement for getting the addresses of:

4.1.1. "www.yahoo.com".

4.1.2. Localhost.

4.1.3. Packet address.

4.2. Write statement(s) for each of the following:

4.2.1. Create a datagram socket object on port 2233.

4.2.2. Create a buffer for incoming datagrams of size 1/2 kilobyte.

4.2.3. Close the datagram socket.

(See next page)

5. Question #5

Using the opposite program answer the following:

5.1. Write the output of the code?

5.2. In lines 5, how class *HelloThread* uses the method *start()*?

5.3. What does code in line 16 do?

5.4. In lines 16 and 25, what is the usage of the method *run()*?

```java
1   public class ThreadHelloCount {
2       public static void main(String[] args) {
3           HelloThread hello = new HelloThread();
4           CountThread count = new CountThread();
5           hello.start();
6           count.start();
7       }
8   }
9   class HelloThread extends Thread {
10      public void run() {
11          int pause;
12          for (int i=0; i<5; i++) {
13              try {
14                  System.out.println("Hello!");
15                  pause = (int)(Math.random()*30);
16                  sleep(pause);
17              }
18              catch(InterruptedException Ex) {
19                  System.out.println(Ex);
20              }
21          }
22      }
23  }
24  class CountThread extends Thread {
25      public void run() {
26          for (int i=0; i<5; i++)
27              System.out.println(i);
28      }
29  }
```

(End of Questions)

Best Wishes

Dr. Bahaa Shabana

3rd **Level Exam**

Mathematics

Statistics & Computer Science

January **2016**

Time : **2 hours**

Faculty of Science

Mathematics Department

Numerical Analysis (1)

Full mark **60**

Answer the following questions

[1] a) Define the fixed point of a function g in [a, b].   (2 marks)

  b) State and prove under which conditions the function g has a unique fixed point in [a, b].
                                                                                         (8 marks)

  c) Use the bisection method to find p_3 for $f(x) = x^3 - x - 1 = 0$ in $[1, 2]$.   (4 marks)

[2] a) (i) Define the multiplicity of the root of f(x) = 0 in [a, b] .

  (ii) Show that Newton-Rhaphson sequence is quadratically convergent when $f'(p) \neq 0$.
                                                                                         (8 marks)

  b) Find the first two iterations of the Gauss-Seidel method for the following system, using $X^{(0)} = (0, 0, 0)^t$

$$x_1 + 2x_2 + 5x_3 = -3, \quad 3x_1 + x_2 + 4x_3 = -2, \quad 6x_1 + 2x_3 = 2 \qquad \text{(6 marks)}$$

[3] a) If f is defined at $x_0, x_1, \dots, x_n \in [a, b]$ such that $x_{i+1} - x_i = h$, then derive Newton forward Divided Difference Polynomial p(x) (NEDDP). Show also that $p(x) = \sum_{k=0}^{n} \binom{s}{k} \Delta^k f(x_0)$.

                                                                                         (7 marks)

  b) Consider the following data

x	1	1.5	2	2.5	3	3.5
f(x)	1	2.25	4	6.25	9	12.25

                                                                                         (12 marks)

  (i)   Use an appropriate interpolation polynomial to approximate $f(1.1)$.
  (ii) Evaluate $f'(2)$ using a three point formula.
  (iii) Use a suitable integration formula to approximate $\int_1^{3.5} f(x)dx$.

[4] a) Define Lipschitz condition. Show that the initial value problem

$$y' = t + y + 1, \quad 0 \le t \le 1, \ y(0) = 1,$$

has a unique solution in $0 \le t \le 1$. Use Runge-Kutta method of order four to approximate the solution with h = 0.1 .   (10 marks)

  b) Let $P_3(x)$ be the interpolating polynomial for the data (0, 0), (0.5, y), (1, 3) and (2, 2). Find y if the coefficient of x^3 in $P_3(x)$ is 6.   (3 marks)

Best Wishes

Dr. Mahmoud Abdelaziz Elbiomy

Mansoura University   Exam :   Jan. 2016

Faculty of Science   Time : 2 hours

Math. Dept.   3rd year (Stat. & Comp. Sci.)

Subject : *Probability Theory (Math. 331)*

___

Answer the following questions: *Total Mark* (80 M.)

[1] a) The joint probability function of X and Y is given by   (12 M.)

$$f(x,y) = e^{-(x+y)} \quad\quad 0 \le x < \infty \ , 0 \le y < \infty$$

Find   (i) $P(Y < X)$ and $P(X < a)$.

       (ii) The diensity function of the random variable $Z = X/Y$.

b) For any two random variables $X \ and \ Y$, prove that

$$Var(X+Y) = Var(X) + Var(Y) + 2Cov(X,Y). \quad\quad \text{(8 M.)}$$

___

[2] a) If X_1 and X_2 are independent random variable having Poisson distribution with parameters λ_1 and λ_2. Find the probability distribution of the random variable $Y = X_1 + X_2$.   (10 M.)

b) Suppose the joint density of X and Y is given by

$$f(x,y) = \frac{e^{-x/y} \, e^{-y}}{y} \quad\quad 0 < x < \infty, 0 < y < \infty$$

Compute $E[X \mid Y = 1]$.   (10 M.)

___

[3] a) If X is a random variable having the density function $f_X(x) = e^{-x}, x \ge 0$.

Find the probability density function for $Y = \ln X$.   (8 M.)

     b) If X is a random variable having the density function.   (12 M.)

$$f(x) = \begin{cases} (1/3) \, e^{-x/3} & x > 0, \\ 0 & O.W. \end{cases}$$

Find   i - $M_X(t)$, the moment generating function.

     ii- Var (X).   iii- α_3 , the skewness.

      iv) The moment generating function of the random variable $Y = 2X - 3$.

___

[4] a) If the joint probability function of X_1 and X_2 is given by   (10 M.)

$$f(x_1,x_2) = \begin{cases} e^{-x_1-x_2} & 0 < x_1 < \infty, 0 < x_2 < \infty \\ 0 & O.W. \end{cases}$$

Show that X_1 and X_2 are independent and that $E(e^{t(X_1+X_2)}) = (1-t)^{-2}, t < 1$.

b) For any random variable X , prove that

$$E(X) = \int_0^\infty P\{X > x\} \, dx - \int_0^\infty P\{X < -x\} \, dx . \quad\quad \text{(6 M.)}$$

c) If X is a random variable with finit mean μ and variance σ^2, then for any value $k > 0$, prove that $P\{|X - \mu| \ge k\} \le \dfrac{\sigma^2}{k^2}$.   (4 M.)

        Best wishes.   *Prof. Beih El-Desouky*

Question₁

(1) [10 Points] Draw a flowchart and Write a code segment that prints the following.

1	10	11
2	20	22
3	30	33
4	40	44
5	50	55

(2) [10 Points] Write an algorithm and a code segment to print the multiplication of two matrices of type 2x2.

Question₂. [10 Points] Write the value of the variable n and the output of the following code segment.

(1)	(2)

int x = 7, y = 3, z = 4, m = 2, n;
  n = --x + z-- % ++y >> m;
  if (n >= 1)
    Console.WriteLine("Final");
  else
    Console.WriteLine("Exam");
	int x = 2, z = 4, m = 1; bool n;
	
	n = x++ * z >= z << m++;
	
	  if (n == true)
	
	    Console.WriteLine("Final");
	
	  else
	    Console.WriteLine("Exam");

Question₃ [10 Points] Write a program that defines the basic mathematical operations. The program defines the following four methods;

1- Min (int, int) for minimum,

2- Max (int, int) for maximum,

3- Round (int) for rounding,

4- Abs (int) for absolute.

Use appropriate return types in all methods and test them in the Main() of a test program.

Question₄ [20 Points] Write a program that creates a class called EMP that contains the basic employee data, including: his Name, Address, Job and ID. The class also contains a set of variables represent the Num_Days , Num_Hours and Hour_Price .

The class should contain the following methods:

1- Total_Salary ( ) that return the net of the Employee's salary according to salary = Num_Days * Num_Hours * Hour_Price .

2- Display () thay print the employee data.

Create Test class that declares two employee objects and call the class methods.

Mansoura University- Faculty of Science
Department: Mathematics
Subject   : Database Management Systems
Date   : 28 / 1 /2016

Level   : 3
Subject code : math 342
Time   : (2) hours

Final-Term Examination First Semester 2015/2016

Answer ALL questions:

Q1: (5 Marks)
a) Define each of the following terms:
   - Database management systems   - Three-Level Architecture of DBMS
b) Describe the components of database management system environment.

Q2: (20 Marks)
a) Draw an E-R diagram using Chen Model for the following requirements of the company database:
   - The company is organized into DEPARTMENTs. Each department has a name, and number. Each department controls a number of PROJECTs. Each department has several employees.
   - Each project has a unique name and a budget. Each project has several employees
   - We store each EMPLOYEE's name, social security number, address, and salary. Each employee works for one department but may work on several projects. We keep track of the start date of the employee on each project.
b) Draw an E-R diagram using UML Model for the previous scenario.
c) Map ER diagram into relational schema.

Q1 : (25 Marks)
Answer the following questions using the following relational schema:

Employee

EmNum	Name	City	Salary	Dep
1	Gad	Tanta	60,000	D02
2	Samy	Cairo	30,000	D02
3	Samy	Tanta	50,000	D01
4	Tamer	Giza	40,000	D03

Department

DepNum	City
D01	Cairo
D02	Giza
D03	Cairo
D04	Tanta

a) Identify the primary and foreign keys in these tables.

b) SQL: DML: Formulate the following queries in SQL:
   1) Find the number of employees working in each branch and the sum of their salaries.
   2) List all employees whose salary is greater than the average salary.
   3) Find the name of the employees and the cities of Department in which they work.
   4) Construct a list of all cities where there is either a department or an employee.
   5) Insert a new employee into the employee table.
   6) Change the city of Department 'Do2 ' to Cairo.
   7) Delete all employee relate to department Do1.

c) SQL: DDL
   1) Give the SQL definitions of the tables: Employee and Department.
   2) Add the attribute ' Position ' in the Employee table.
   3) Remove the attribute ' City ' from the Department table.
   4) Create a view that displays the details for employees who works in branch D02.

Q3 : (10 Marks)
Illustrate the process of normalizing the *Project* table shown to 3NF relations. Identify the primary and foreign keys in your 3NF relations.

Project

Project_Num	Project_Name	Emp_Num	Emp_Name	Job	Chg_Hour	Hours_worked
p1	Badr1	234	Hana	Manager	$150	24
		231	Aly	Engineer	$130	20
p2	Badr2	231	Aly	Engineer	$130	18
		225	Hany	Manager	$150	20

"Good luck"   Dr.Eng. Mahmoud Abu Alfutuh

Mansoura University- Faculty of Science
Department: Mathematics
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Date   : 28 / 1 /2016

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