University of Mansoura
Faculty of Science
Course Name :Operating System
Examiner: Dr. Mahmoud Abd Ellatif

Math. 345

Second Term 2010- 2011
Final Exam
Date 18-6-2011
Marks :60 / 2 hours

Q N 1 : Answer the following : **(15 Marks)**

A. Explain Two- phase Locking Protocol as Concurrency control algorithms, to illustrate your explain assume example .**(9 Marks)**

B. Write essay (three pages) to describe the various ways of organizing memory hardware and memory management techniques including paging and segmentation. .**(6 Marks)**

Q N 2 (20 Marks)

A. What is the process, what are the states of process , explain and draw Diagram Of process state.**(8 Marks)**

B. In deadlock problem , Consider the following snapshot of a system: .**(12 Marks)**

	Allocation	*Max*	*Available*
	A B C D	*A B C D*	*A B C D*
P_0	0 0 1 2	0 0 1 2	1 5 2 0
P_1	1 0 0 0	1 7 5 0	
P_2	1 3 5 4	2 3 5 6	
P_3	0 6 3 2	0 6 5 2	
P_4	0 0 1 4	0 6 5 6	

Answer the following questions using the banker's algorithm:

i. What is the content of the matrix *Need?*

ii. Is the system in a safe state?

iii. If a request from process Pi arrives for (0,4,2,0), can the request be granted immediately?

Q N 3 (25 Marks)

A. What are the Goals of Protection and what are the main differences between capability lists and access lists? Draw Access Matrix with Domains as Objects. .**(9 Marks)**

B. Consider the following set of process with the length of the CPU-burst time given in milliseconds

process	Burst time	priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

The processes are assumed to have arrived in the order p1,p2,p3,p4,p5 all at time 0.

i. Draw four Gantt chart illustrating the execution of these processes using FCFS,SJF, a non preemptive priority (a smaller priority number implies a higher priority , and RR (quantum=1)scheduling.**(7 Marks)**

ii. What is the turnaround time of each process for each of the scheduling algorithms in part i ? .**(3 Marks)**

iii. What is the waiting time of each process for each of the scheduling algorithms in part i? .**(3 Marks)**

iv. Which of schedules in part a result in the minimal average waiting time ? .**(3 Marks)**

With my best wishes
Dr. Mahmoud Abd Ellatif

Mansoura University Faculty of Science Department of Mathematics		Third level May: 2010/2011 Course name: Artificial intelligence Course code: Math.344 Time: 2 h. Program: Stat. & Computer Science

Answer the following question: (Total grades: 60)

1. What is the difference between human-centered and rational AI approaches? **(6 G)**

2. Consider a state space where the start state is number 1 and the successor function for state n returns two states, numbers 2n and 2n+1. **(15 G)**
   a. Draw the portion of the state space for state 1 to 15.
   b. Suppose the goal state is 11. List the order in which nodes will be visited for breadth-first search, depth-limited search with limit 3, and iterative deepening search.
   c. Would bidirectional search be appropriate for this problem? If so, describe in detail how it would work.
   d. What is the branching factor in each direction of the bidirectional search?
   e. Does the answer to (c) suggest a reformulation of the problem that would allow you to solve the problem of getting from state 1 to a given goal state with almost no search?

3. The heuristic path algorithm is a best-first search in which the objective function is $f(n)=(2-w)\,g(n) + w\,h(n)$. For what values of w is this algorithm guaranteed to be optimal? What kind of search does this perform when w=0? When w=1? When w=2? **(10 G)**

4. Describe briefly the basic types of the rational agents and draw their schematic diagrams? **(10 G)**

5. What is the type of problems that can be solved by using Artificial Neural Networks (ANNs)? List the main strengths, advantages, and disadvantages of ANNs? **(10 G)**

6. Suppose we are looking at a map of Australia showing each of its states as shown in the following figure, and that we are given the task of coloring each region either red, green, or blue in such a way that no neighboring regions have the same color.

   a. Show graphically how to solve this problem by using Degree Heuristic technique. **(7 G)**
   b. Show graphically how to solve this problem by using Least Constraining Value. **(7 G)**

With my best wishes
Dr. Mohammed Elmogy

Mansoura University		**Math 343**
Faculty of Science		**Time Two Hours**
Mathematics Department	**Subject Computer Algebra sys.**	**Date 25-6-2011**
Final examination	**Third Level Stat-CompSc**	**Full marks 60**

Answer the following questions: (***Calculator not Allowed***)

1- i) Use the solve command to solve the equation $f(x) = 7\,x^4 - 10x^3 - 9x^2 - 10$

Find the Minimum and Maximum of f , plot f in [-6,6]

ii) Find the sum of the squares of the number from 1 to 100.

iii) Use Newton Raphson iteration $x_{n*1} = x_n - \frac{f(x_n)}{Df(x_n)}$ to get the roots

of f(x) =x+sin(x) -π, x(0) =2.7

(18 marks)

2- i) Consider the problem of finding a critical point of the function

$$f(x,y,z) = x^2yz - xy^3 + xz^2 + y$$

i.e. a point where the partial derivatives $\frac{\partial f}{\partial x}$, $\frac{\partial f}{\partial y}$ and $\frac{\partial f}{\partial z}$ are all 0.

ii) Write the output of the following code

```
g:= x -> r*(x - x^2);
r=2.5;
x[0]= .4:
four count from 1 to 3 do
x[count]:=g(x[count-1])
end do;
```

iii) Write the output of the following code

```
f := x^2;
for k from 1 by 1/2 to 5 do
subs( x = k, f );
od;
```

(18 marks)

P.T.O

3- (i) Solve the initial value problem

$$y^{(4)} + 10y''' + 38y'' + 66y' + 45y = 4\,,$$

$$y(0) = 1,\ y'(0) = 0,\ y''(0) = -1,\ y'''(0) = 2$$

ii) Using Maple tosolve the following system of linear equations.

$$6x + 3y - 2z = 1$$

$$8x + 7z = 2$$

$$9x + 5y + 4z = -3$$

iii) Find the eigenvalues, eigenvectors , determinant and the inverse of the matrix

$$\mathbf{A} = \begin{matrix} 6 & 3 & -2 & 1 \\ 8 & 0 & 7 & 2 \\ 9 & 5 & 4 & -3 \end{matrix}$$

iv) A particle moves along a coordinate axis in such a way that its velocity v(t) at time t is given by the equation$v(t) = 4t^3 + t^2 + 1$. If the coordinate of the particle is 3 at time t=1, then what is its position at time t=2?

(24 marks)

Examiner Prof H N Agiza

المستوى الثالث - الاحصاء وعلوم الحاسب / ر٣٤٠ نظرية المنطق الرياضي

Subject: Mathematical Logic
Subject Code: R340
Allowed Time: 2 hours
Second Semester, June 11, 2011

Mansoura University
Faculty of Science, Mathematics Dept.
3rd Level Statistics and Computer Science

Answer the following questions

Question 1 ***(25 Marks)***

1. State and prove the Deduction Theorem of the formal system ***L***
2. determine whether of the following statements are tautology, contradiction or neither
   (a) $(((p \to q) \to q) \to q)$
   (b) $p \wedge (\sim (p) \vee q)$
   (c) $((q \vee r) \to ((\sim r) \to q))$
3. For any w.f.s ***A,B*** and ***C*** of the formal system ***L,*** prove that
   (a) $\vdash_L ((\sim A \to A) \to A)$
   (b) $\{(A \to B), (\sim (B \to C) \to (\sim A))\} \vdash_L (A \to C)$

Question 2 ***(25 Marks)***

1. Give the definition of the formal deductive system $K_{\mathcal{L}}$, the first order language , the interpretation I, the valuation function on I.
2. Let A be a w.f. of $\mathcal{L}$ and let I be an interpretation of $\mathcal{L}$. Then $I \models A$ if and only if $I \models (\forall x_i) A$, where x_i is any variable.
3. For any w.f.s A and B of $\mathcal{L}$ prove that $\vdash_K ((\forall x_i)(A \to B) \to ((\exists x_i) A \to (\exists x_i) B))$.

Question 3 ***(30 Marks)***

1. State and prove the Soundness theorem of formal deductive system $K_{\mathcal{L}}$.
2. Translate into symbols the following statements using quantifiers, variables and predicate symbols.
   i) Not every function has a derivative
   ii) Some people hate every one.
   iii) Elephants are heavier than mice.
3. For any wfs. A, B and C of L, prove that
   a. $\{(A \to B), (B \to C)\} \vdash_L (A \to C)$
   b. $\{A \to (B \to C), B\} \vdash_L (A \to C)$
4. Prove that for any w.f.s. A and B of $\mathcal{L}$ then $\{A, (\forall x_1) A \to B\} \vdash (\forall x_1) B$

مع اطيب التمنيات بالتوفيق

د/ السيد فؤاد

٣ إحصاء رياضي - تحليل الانحدار (٣٣٤ر)

جامعة المنصورة
كلية العلوم
قسم الرياضيات

المادة :تحليل انحدار(٣٣٤ر)
الفصل الدراسي: الثاني
تاريخ الامتحان : ٢١ يونيو ٢٠١١

المستوى: الثالث
الشعبة : إحصاء وعلوم الحاسب
الزمن : ساعتان

أجب عن الأسئلة التالية:-

السؤال الأول:) (20 درجة)

١- أثبت أن الخطأ المعياري للتقدير يمكن كتابته على الصورة التالية **(6 درجات)**

$$S_e = S_{y/x} = \sqrt{\frac{\sum y_i^2 - b_0 \sum y_i - b_1 \sum x_i y_i}{n-2}}$$

٢- إذا كان معامل الانحدار b_1 له توزيع طبيعي فاثبت أن متوسطه β_1 وتباينه $\frac{\sigma^2}{\sum (x_i - \bar{x})^2}$

(14 درجة)

السؤال الثاني: (20 درجة)

١- إذا كانت B مقدر لمعامل الانحدار b_1 فاثبت أن $\bar{Y}, B$ غير مرتبطين حيث أن

$$Y_i = b_0 + b_1 x_i$$ **(5 درجات)**

٢- الجدول التالي يوضح العلاقة بين Xو Y على النحو التالي: **(15 درجة)**

X	5	3	7	4	8	2	10	6	8	7	9	11
Y	8	6	8	5	9	6	8	5	11	7	8	10

احسب معادلة خط انحدار Yعلى X – الخطأ المعياري للتقدير- معامل التحديد- حدود فترة ثقة لمعامل الانحدار عند مستوى معنوية $\alpha = 0.05$ -اختبار فرض حول معنوية معامل الانحدار وذلك عند مستوى معنوية $\alpha = 0.05$.

السؤال الثالث(20 درجة)

١- إذا كانت معادلة خط انحدار Yعلى X يمكن كتابتها على الصورة **(10 درجات)**

$$Y_i = b_0 + b_1 X_i$$

وإذا كانت $x = X - \bar{X}$ ، $y = Y - \bar{Y}$ فاثبت أن:-

$$S_e^2 = S_{y/x}^2 = \frac{\sum_{i=1}^{n} y_i^2 - b_1 \sum_{i=1}^{n} x_i y_i}{n-2}$$

انظر خلفه

٢- أثبت أن: $\sum_{i=1}^{n}(y_i-\bar{y})^2=\sum_{i=1}^{n}(y_i-\hat{y}_i)^2+\sum_{i=1}^{n}(\hat{y}_i-\bar{y})^2$ **(10 درجات)**

السؤال الرابع: (20 درجة)

١- إذا كانت دالة الكثافة الاحتمالية المشتركة على الصورة **(10 درجات)**

$$f(x,y)=\begin{cases}xe^{-x(1+y)} & x>0,y>0\\ 0 & otherwise\end{cases}$$

أوجد منحنى انحدار y على x.

٢- الجدول التالي يبين السلسلة الزمنية لإحدى الظواهر **(10 درجات)**

X	1953	1954	1955	1956	1957	1958	1959	1960
Y	3	5	11	16	30	38	50	60

أوجد معادلة خط الاتجاه العام على فرض أنها من الدرجة الثانية، موضحا نقطة الأصل والوحدة الزمنية، علما بأن $t_{(0,0.025)}=2.228$

مع التمنيات الطيبة بالتوفيق
د/ محمود الطنطاوي

المستوى الثالث رياضيات - الدوال الخاصة (٣٤٤)
اقصار حاسب

الفرقة: الثالثة **برنامج:** الرياضيات & الإحصاء وعلوم الحاسب **المقرر:** دوال خاصة	كلية العلوم – قسم الرياضيات	دور يونيو ٢٠١١ الزمن: ساعتان التاريخ: ٢٠١١/٦/٢٨

أجب عما يأتى :

السؤال الأول: (٢٠ درجة)

(i) اثبت أن : $\Gamma''(x)=\int_0^{\infty} e^{-t}t^{x-1}(\ln t)^2\,dt$ (ii) احسب $\Gamma(-\frac{3}{2})$

(iii) احسب التكامل $\int_0^{\infty} 2x^2e^{-2x}\cosh x\,dx$

(iv) عرف دالة بيتا باستخدام الدوال المثلثية ومن ثم اثبت أن: $\beta(x,x)=2^{1-2x}\beta(x,\frac{1}{2}),\quad x>0$

السؤال الثانى: (٢٠ درجة)

(i) اثبت أن: $\int_0^{\infty} x^{-\frac{3}{2}}J_{5/2}(x)\,dx=\sqrt{\frac{2}{\pi}}\left(\frac{\cos x}{x^2}-\frac{\sin x}{x^3}\right)+c$

(ii) اثبت أن: $y=\sqrt{x}\,J_{3/2}(x)$ حل للمعادلة $x^2y''+(x^2-2)y=0$.

(iii) اثبت أن: $\frac{d}{dx}\{x^n I_n(x)\}=x^nI_{n-1}(x)$

السؤال الثالث: (٢٠ درجة)

(i) اثبت أنه لأى دالة $f(x)$ أن $\int_{-1}^{1} f(x)P_n(x)dx=\frac{(-1)^n}{2^n n!}\int_{-1}^{1}(x^2-1)^n f'^n(x)dx$.

(ii) عبر عن الدالة $f(x)=3x^2+5x$ بدلالة كثيرات حدود لاجندر.

(iii) اثبت أن : $H_n(x)=(-1)^n e^{x^2}\frac{d^n}{dx^n}e^{-x^2}$

السؤال الثالث: الرابع (٢٠ درجة)

(i) اثبت أن : $J_n(x)=\frac{x^n}{2^n n!}\,{}_0F_1\left(n+1;\frac{-x^2}{4}\right)$ (ii) $nL'_n(x)=nL_n(x)-nL_{n-1}(x)$

(iii) اثبت أن : $\int_{-\infty}^{\infty} e^{-x^2}H_m(x)H_n(x)dx=\begin{cases}0, & m\neq n\\ 2^n n!\sqrt{\pi}, & m=n\end{cases}$

مع أطيب التمنيات بالنجاح

د/ مجدى برسوم

المستوى الثالث - الرياضيات + الحاسوب - ر ٣١٨ المعادلات التكاملية

بسم الله الرحمن الرحيم

Faculty of Science
Mathematics Department.

المســـتوى الثالـــث
برنامجى الرياضيات +الإحصاء وعلوم الحاسب
المقرر المعادلات التكاملية ر318

Second Term
June 2011
Time : 2 hours
Full mark : 80

1 – a) Show that solution of the following integral equation

$$\int_0^x (x-t)e^{\lambda(x-t)}\phi(t)dt = f(x),$$

is $\phi(t) = f''(x) - 2\lambda f'(x) + \lambda^2 f(x)$ . . *(10 Marks)*

b)- Show that $\mathcal{L}\left\{\int_0^x K(x-t)\phi(t)dt\right\} = \mathcal{L}\{K(x)\}\,\mathcal{L}\{\phi(x)\}$

where $\mathcal{L}$ is the Laplace transform operator. *(10 Marks)*

2 – Use the method of Fredholm's determinants to solve the following integral equation.

$$\phi(x) = x + \int_0^1 \left(x^2 t - t^2 x\right)\phi(t)dt \quad . \qquad \textit{(20 Marks)}$$

3- Solve the following integral equation

$$\phi(x) = (ae)^x + \int_0^x a^{x-t}\phi(t)dt \quad . \qquad \textit{(20 Marks)}$$

4 - Find the characteristic numbers and Eigen functions for the following integral equation with degenerate kernel

$$\phi(x) = \lambda\int_0^1 K(x,t)\phi(t)dt \quad , \quad K(x,t) = \begin{cases} -e^{-t}\sinh(x) & 0 < x < t \\ -e^{-x}\sinh(t) & t < x < 1 \end{cases} \qquad \textit{(20 Marks)}$$

Best Wishes *Professor Mohamed N Allam*