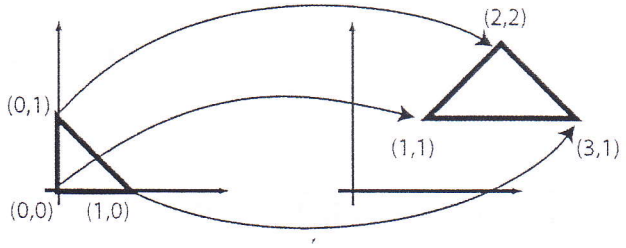
	Assiut University **Faculty of Science** **Mathematics Dept.**	**Final Exam** **Computer Graphics** **Code : MC461**	**Date :14/1/2020** **Level: fourth** **Time : 2 hours**	

Answer the following questions: **(50 Marks)**

Question 1: **(10 Marks)**

- To what point is (-2.0, 3.0, 9.0) transformed by glScalef- (3.0, 1.0, -8.0)?
- What is the OpenGL scaling that transforms (3.0,-1.0, 2.0) to (3.0, 5.0, 9.0)?
- To what point is (-2.0, 3.0, 9.0) transformed by glTranslatef(5.0, 0.0, 0.0); followed by glTranslatef(5.0, 0.0, 0.0);?
- Suppose we have a unit triangle (shown on the left) and we want to transform it into the triangle on the right. Write a matrix (give all the entries in the matrix) that transforms the triangle in the desired way.



Question 2: **(10 Marks)**

a) Suppose we have the following sequence of 2D transformations: **R(90) T(0,1) R(90) T(2,0)**. Assume you have a unit square (extending from 0 to 1 in x and y) at the origin. Draw out the intermediate four positions of the square as each transformation is applied.

b) Show **using diagrams** the difference between Convex polygon and nonconvex polygon

Question 3: **(10 Marks)**

a) Explain and show **using diagrams** the OpenGL's geometric primitives.

b) Write the OpenGL command for the geometric Primitives.

Question 4: **(10 Marks)**

The transformation t_1 given by the translation command glTranslatef(5.0, 0.0, 0.0) corresponds to the matrix M_1. Similarly, The transformation t_2 given by the translation command glTranslatef(0.0, 10.0, 0.0) corresponds to the matrix M_2. Write a matrix M_1 and M_2. To what point is V(-2.0, 3.0, 9.0) transformed by applying t_2 followed by t_1?

Question 5: **(10 Marks)**

Draw the output of the following OpenGL code segments.

glBegin(GL_POLYGON);
glVertex2f(2.0, 2.0);
glVertex2f(8.0, 2.0);
glVertex2f(8.0, 8.0);
glVertex2f(2.0, 8.0);
glEnd();
	glBegin(GL_POLYGON);
	glVertex2f(2.0, 2.0);
	glVertex2f(8.0, 2.0);
	glVertex2f(8.0, 8.0);
	glEnd();

(a)	**(b)**

glBegin(GL_TRIANGLES_FAN);
glVertex2f(2.0, 0.0);
glVertex2f(2.0, 3.0);
glVertex2f(4.0, 3.0);
glVertex2f(4.0, 5.0);
glVertex2f(6.0, 5.0);
glEnd();
	glBegin(GL_LINE_LOOP);
	glVertex2f(-0.5, -0.5);
	glVertex2f(-0.5, 0.5);
	glVertex2f(0.5, 0.5);
	glVertex2f(0.5, -0.5);
	glEnd();

(c)	**(d)**

glBegin(GL_LINE_STRIP);
glVertex2f(-0.5, -0.5);
glVertex2f(-0.5, 0.5);
glVertex2f(0.5, 0.5);
glVertex2f(0.5, -0.5);
glEnd();	

(e)	

Best Wishes

Dr. Mohamed Mostafa Darwish

Faculty of Science
Math. Dept.

Final Exam
Subject: Neural Network
Code: MC459
Time: 2 Hours
17-01- 2020

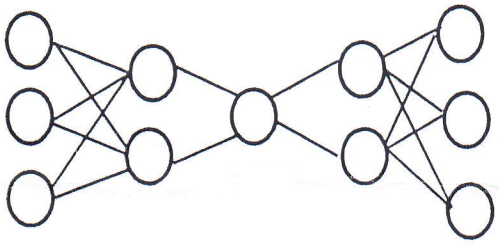
Assiut University

Answer the following questions, where each has 12.5 points. The exam is in two pages.

Q1

1. Write the aim of neural network in one mathematical equation.
2. Explain how we can use neural network to make a new chemical component.
3. Write the formal algorithm that describes the method RMSProp.
4. Draw a figure that explains the bad and good learning rate from the change in loss function. What is the best way to choose the learning rate?

Q2. For the next network, do these requirements:



1. Build this network using KERAS.
2. Using KERAS to update the weights using the method adam.
3. Train this network with KERAS.

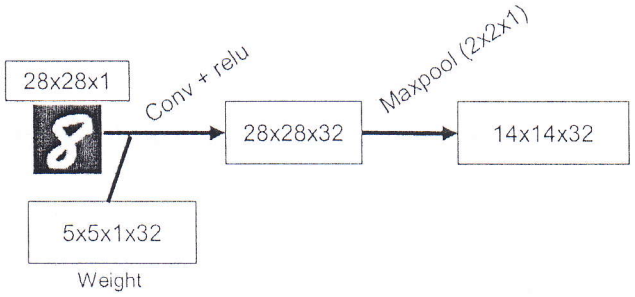
Q3.

1. What is the main advantage of using Deep Learning?
2. Explain the main Deep Learning operations: Convolution and pooling to the next matrix A and the kernel k. Apply then the max pooling for the new matrix.

$$A = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 2 & 2 & 2 & 2 & 0 \\ 0 & 1 & 2 & 2 & 2 & 1 & 0 \\ 0 & 1 & 2 & 1 & 1 & 2 & 0 \\ 0 & 2 & 1 & 2 & 1 & 2 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}, \qquad k = \begin{bmatrix} -1 & 1 & 1 \\ 1 & 0 & 1 \\ -1 & 1 & 1 \end{bmatrix}$$

==========See the next page==========

3. Convert the next flowchart to Tensorflow code that represents the Deep learning.



Q4.

- Compare between the supervising learning and supervising learning.
- Draw the AutoEncoder with deep learning network.
- Draw ResNet.

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End of the Exam. Best Wishes, Ibrahim Elsemman

كلية العلوم — امتحان الفصل الدراسي الثاني للعام الدراسي 2019 – 2020 — المادة : معادلات تفاضليه جزئيه

قسم الرياضيات — لطلاب كلية العلوم – قسم الرياضيات — الزمن : ثلاث ساعات

المستوي الرابع –مقرر 414 ر — الدرجة الكلية : 50درجة

اجب عن عن خمسة فقط من الاسئلة الاتية :- (10درجات لكل سؤال:5 درجات لكل فقره)

1) اوجد الحل الكامل و الحل المفرد- ان وجد – لكل من المعادلتين الاتيتين

(i) $9(p^2z+q^2)=4$

(ii) $z=px+qy+3(pq)^{\frac{1}{3}}$

---

2) اوجد الحل الكامل للمعادلة الاتية :- $p^2x+q^2y=z$

(*i*) باستخدام طريقة شاربت

(*ii*) باستخدام طريقة جاكوبي

---

3) *(i)* اثبت ان النظام الاتي متوافق واوجد حله :- $x^2p+q=xz \quad , \quad xp-yq=x$

(ii) حل المعادلة الاتية :- $xyr+x^2s-yp=x^3e^y$

---

4) استخدم التعويض $u=logx \quad , \quad v=logy$ لايجاد حل كل من المعادلتين الاتيتين :-

(i) $q^2y^2=z(z-px)$

(ii) $(x^2D_1^2-xyD_1D_2-2y^2D_2^2+xD_1-2yD_2)z=\left(log\frac{y}{x}\right)-\frac{1}{2}$

---

5) اوجد حل كل من المعادلتين الاتيتين :-

(i) $sy-2xr-2p=6xy$

(ii) $r-p-\frac{1}{y}\left(\frac{1}{y}-1\right)z=x^2y-x^2y^2+2xy^3-2y^3$

---

6) استخدم طريقة لابلاس لحل كل من المعادلتين الاتيتين :-

(i) $x(y-x)r-(y^2-x^2)s+y(y-x)t+(y+x)(p-q)=2x+7y+2$

(ii) $y^2r-2xys+x^2t=\frac{y^2}{x}p+\frac{x^2}{y}q$

انتهت الأسئلة مع اطيب الامنيات بالنجاح

لجنة الممتحنين د. مجدي كامل الجندي , د. محمد عبد الله عبد الرازق

Department of Mathematics		قسم الرياضيات
Faculty of Science		كلية العلوم

امتحان نهائي الفصل الدراسي الثاني 2020/2019م

للفرقة : الرابعة التاريخ : 12/ 1/ 2020م

اسم المقرر :هيدروديناميكا ومرونة (1)	شعبة :رياضيات	الزمن : ساعتان
الدرجة الكلية : 50 درجة	رقم المقرر ورمزه :431ر	

أجب عن أربعة أسئلة فقط مما يأتي: (12,5 درجة لكل سؤال)

1- أ) اذا كان معلوم أحد الاتجاهات الأساسية. كيف يمكنك تحديد الاتجاهات الأساسية الآخرى. (6 درجات)

ب) جسم مرن مجهد يعطى بالعلاقات الآتية:

$$\sigma_x = 2xy,\ \ \tau_{xy} = 5y^2,\ \tau_{yz} = 2z,\ \ \sigma_y = \sigma_z = \tau_{xz} = 0$$

أوجد الاجهادات عند النقطة $(2, 1, \sqrt{3})$ التي تقع على المستوى المماسي للاسطوانة $y^2 + z^2 = 4$

(6.5 درجة)

2- أ) استنتج مركبات الانفعال بدلالة مركبات الاجهاد. ومن ثم اوجد قانون هوك للتغير الحجمي. (6.5 درجة)

(ب) اثبت أن مجسم الانفعالات هو عبارة عن معادلة سطح من الدرجة الثانية. (6 درجات)

3- أ) صفيحة رقيقة طولية سمكها t وعرضها b وطولها ℓ تتحمل قوة محورية p ينتج عنها اجهاد σ_x وليكن في الانجاه x وعرضها في الانجاه y وسمكها في الاتجاه z . موضوعة بين حائطين ثابتين أملسين وذلك لمنع تمددها في الاتجاه y . عين مركبات الاجهاد والانفعال. (6.5 درجة)

ب) استنتج معادلة الاتصال للموائع ، ثم استنتج معادلات مائع مثالي غير قابل للتضاغط ،ثم استنتج منها معادلة برنوللي. (6 درجات)

4- أ) اكتب منطوق نظرية بلازيوس ، انسياب منتظم له السرعة U عند اللانهاية ينساب في الاتجاه الموجب لمحور x يمر علي اسطوانة دائرية ثابتة نصف قطرها a مع وجود لف حولها شدته k . احسب الضغط المؤثر علي الاسطوانة والعزم حولها. (6.5 درجة)

ب) استخدم التحويل $\zeta = z^3$ لنقل المنطقة في المستوي z المحددة بالاقواس الدائرية $r=a,\ r=b$ وانصاف الاقطار $\theta = o,\ \theta = \pi/3$ (6 درجات)

5-أ) ادرس حركة مستوي لانهائي الطول تحرك فجأة في مستواه بسرعة ثابتة في مائع لزج غير قابل للتضاغط . (6.5 درجة)

ب) اكتب نظرية باي للتحليل البعدى ، ثم استخدمها في ايجاد قانون قوة المقاومة المؤثرة علي وحدة السطوح من جدار انبوبة مع فرض انها دالة في معامل اللزوجة μ والكثافة ρ والقطر d والسرعة v . (6 درجات)

انتهت الأسئلة مع تمنياتي بالنجاح

أ0د/ فكري محمد حادي ، د/ حسين السيد حسن حماد

Faculty of Science
Mathematics Department
First Term Exam
Software Engineering
Code: MC467
Time: 2 hours
December 2019

كلية العلوم
قسم الرياضيات

امتحان الفصل الدراسي الاول
المستوي: الرابع
المقرر: تصميم وهندسة البرمجيات
الرمز: 467 رك
الزمن: ساعتان
ديسمبر ٢٠١٩

Answer the following questions (50 Marks)

Question 1: Complete the following statements from the given table. (20 Marks)

***Note*: each answer may be used several times.**

1	Software engineering	6	V-Shaped	11	Waterfall	16	Cohesion
2	Use Case	7	Secondary	12	Workers	17	Actors
3	Code and Fix	8	Lifecycle	13	Non-functional	18	Functional
4	Planning	9	Rapid Prototyping	14	Agile	19	Knowing
5	Unified Process	10	Software	15	Doing	20	Spiral

a. ..... is computer programs and associated documentation. ( )

b. ..... is concerned with the practicalities of developing, delivering, and maintaining useful software. z ( )

c. Project ..... is the art of scheduling the necessary activities, in time, space and across staff. ( )

d. ..... model is a description of the sequence of activities carried out in an SE project, and the relative order of these activities. ( )

e. ..... model is used when requirements are very well known. ( )

f. In ..... model, testing of the product is planned in parallel with a corresponding phase of development. ( )

g. ..... is the state of magnetization, voltage level, or current flow in electronic devices. ( )

h. Project plan = ...model + Project parameters ( )

i. ..... model corresponds with no plan! (**Hacking**!) ( )

j. ..... requirements define factors, such as I/O formats, storage structure, computational capabilities. ( )

k. A/An ... is a description of how a user will use the system-to-be to accomplish business goals ( )

l. ..... actor participates in the use case but does not initiate it. ( )

m. ..... model is used when requirements are complex. ( )

n. .....model used lifetime of a software product in **cycles**. ( )

o. ..... get assigned mainly doing responsibilities ( )

p. High ..... Principle means do not take on too many computation responsibilities. ( )

q. .....responsibility means memorizing data or references, such as data values, data collections. ( )

r. System Sequence Diagrams considered interactions between the ..... ( )

s. Traceability Matrix is used to prioritize the work on ..... ( )

t. ..... responsibility means performing computations, such as data processing, control of physical devices, etc. ( )

Question 2:

(15 Marks)

State the requirements and use cases for the following user story "As an internet banking customer, I want to see a rolling balance for my everyday accounts. So that I know the balance of my account after each transaction is applied"

Question 3:

Extract the responsibilities and draw the domain model for the following use case: **(15 Marks)**

Identifier	Priority	Requirement
REQ1	5	The system shall keep the door locked at all times, unless commanded otherwise by authorized user. When the lock is disarmed, a countdown shall be initiated at the end of which the lock shall be automatically armed (if still disarmed).
REQ2	2	The system shall lock the door when commanded by pressing a dedicated button.
REQ3	5	The system shall, given a valid key code, unlock the door and activate other devices.
REQ4	4	The system should allow mistakes while entering the key code. However, to resist "dictionary attacks," the number of allowed failed attempts shall be small, say three, after which the system will block and the alarm bell shall be sounded.
REQ5	2	The system shall maintain a history log of all attempted accesses for later review.
REQ6	2	The system should allow adding new authorized persons at runtime or removing existing ones.
REQ7	2	The system shall allow configuring the preferences for device activation when the user provides a valid key code, as well as when a burglary attempt is detected.
REQ8	1	The system should allow searching the history log by specifying one or more of these parameters: the time frame, the actor role, the door location, or the event type (unlock, lock, power failure, etc.). This function shall be available over the Web by pointing a browser to a specified URL.
REQ9	1	The system should allow filing inquiries about "suspicious" accesses. This function shall be available over the Web.

Use Case UC-1: Unlock

Related Requirements: REQ1, REQ3, REQ4, and REQ5 stated in Table 2-1

Initiating Actor: Any of: Tenant, Landlord

Actor's Goal: To disarm the lock and enter, and get space lighted up automatically.

Participating Actors: LockDevice, LightSwitch, Timer

Preconditions:
- The set of valid keys stored in the system database is non-empty.
- The system displays the menu of available functions; at the door keypad the menu choices are "Lock" and "Unlock."

Postconditions: The auto-lock timer has started countdown from autoLockInterval.

Flow of Events for Main Success Scenario:

→ 1. Tenant/Landlord arrives at the door and selects the menu item "Unlock"

2. include::AuthenticateUser (UC-7)

← 3. System (a) signals to the Tenant/Landlord the lock status, e.g., "disarmed," (b) signals to LockDevice to disarm the lock, and (c) signals to LightSwitch to turn the light on

4. System signals to the Timer to start the auto-lock timer countdown

5. Tenant/Landlord opens the door, enters the home [and shuts the door and locks]

Dept. of Mathematics
Faculty of Science
Assiut University
Dec. 28 , 2019

Course:Functional Analysis
Code: 411 M
B.Sc Exam
Time: 2 Hours

Answer four questions only from the following questions:

First Question (12 Degree)

(a) Let X= C[0,1] be the space of all continuous functions on [0,1] with metric

$$d(f,g)=\int_0^1 |f(x)-g(x)|dx \quad f,g\in X.$$

Show that (X,d) in not complete.

(b) State and prove Banach fixed point theorem in a complete metric space.

(c) Using Banach fixed point theorem to show that **the** equation $x^3+3x-1=0$ **has a unique solution in [-1,1].**

Second Question (12 Degree)

(a) Let $(C[-1,1],\|\ \|_\infty)$ e a space of continuous functions on [-1,1] with norm

$$\|x\|_\infty = \sup_{t\in[-1,1]} |x(t)| \quad .$$

Show that the functional

$$f(x)=\int_{-1}^{0} x(t)dt-\int_0^1 x(t)dt$$

is linear,continuous and bounded .Find $\|f\|$

(b) Let T be a mapping of (R,d) into itself . Show that the condition :

$$d(Tx,Ty)<d(x,y)\ , \quad x\neq y$$

is insufficient for the existence of a fixed point of T.

(c) Prove that on a finite dimensional normed space $(X,\|\ \|)$ **every linear operator on X is bounded.**

Third Question (13 Degree)

(a) Show that the space ℓ^∞ **is a Banach space.**

(b) Prove that every finite dimensional subspace Y of a normed space X is complete.

(c) Let $X=R^n$ **with the norm:**

$$\|x\|_p=\left(\sum_{i=1}^{n}|x_i|^p\right)^{1/p},\ 0<p<1, n>2, x\in R^n.$$

Show that $(X,\|\ \|_p)$ **is not a normed space**

Fourth Question (13 Degree)

(a) **Define equivalent norms on a vector space X and give examples with proof for two equivalent norms and for two nonequivalent norms.**

(b) Prove that on a finite dimensional normed space any two norms are equivalent.

(c) Suppose $\|\ \|_1$ *and* $\|\ \|_2$ **are equivalent norms on a vector space X .Show that for any sequence** (x_n)

$$\|x_n-x\|_1=0 \Leftrightarrow \|x_n-x\|_2=0$$

P.T.O

Fifth Question (13 Degree)

(a) Let Xbe an inner product space .Show that :

$$\sqrt{(x+y,x+y)} \leq \sqrt{(x,x)}+\sqrt{(y,y)} \quad x,y \in X$$

(b) Give an example of non-bounded operator on a normed space $(X,\|\ \|)$.

(c) For any sequences (x_n) *and* (y_n) **in an inner product space X ,** $x_n \to x, y_n \to y$.
Prove that $<x_n,y_n> \to <x,y>$.

Prof.R.A.Rashwan **The End**

Department of Mathematics, Faculty of Science, University of Assiut .		كلية العلوم قسم الرياضيات
امتحان المستوي الرابع التاريخ: 2020/1/5م	الدرجة الكلية : 50 درجة	العام الدراسي 2020/2019 م
الزمن: ثلاث ساعات	رمز المقرر: 427ر	مسمى المقرر: مواضيع مختارة في الرياضيات (2)

أجب عن خمسة فقط من الأسئلة التالية: (كل سؤال 10 درجات)

1 – Arrange the following in descending order for small ε :

$$ln(1+\varepsilon)\,,\ sech^{-1}\varepsilon\,,\ \frac{1-cos\,\varepsilon}{1+cos\,\varepsilon}\,,\ \sqrt{\varepsilon\,(1-\varepsilon)}\,,\qquad e^{-cosh\frac{1}{\varepsilon}}\,,$$

$$ln\left[1+\frac{ln\,(\frac{1+2\varepsilon}{\varepsilon})}{1-2\varepsilon}\right],\qquad ln\left[1+\frac{ln\,(1+2\varepsilon)}{\varepsilon(1-2\varepsilon)}\right],\qquad \frac{\sqrt{\varepsilon}}{1-cos\,\varepsilon}\,.$$

(10 Marks)

2 – For small ε , determine two terms in the expansion of each root of the following equations:

a) $x^3-(3+\varepsilon)x-2+\varepsilon=0$.

b) $\varepsilon\,x^5-3x^2+6x-3=0$. (10 Marks)

3 – The asymptotic expansion of Bessel's function $J_v(x)$ for large x is

$$J_v(x)=\sqrt{\frac{2}{\pi x}}\left[cos\left(x-\frac{v\pi}{2}-\frac{\pi}{4}\right)-\frac{4v^2-1}{8x}\,sin\left(x-\frac{v\pi}{2}-\frac{\pi}{4}\right)\right]+\cdots.$$

Show that the large roots of $J_v'(x)=0$ are approximately given by

$$x=\left(n+\frac{1}{4}+\frac{v}{2}\right)\pi-\frac{3+4v^2}{2\pi(4n+1+2v)}+\cdots.$$ (10 Marks)

4 – Show that as $x\to\infty$

$$\int_x^\infty \frac{cos(t-x)}{t}\,dt\cong\frac{1}{x^2}-\frac{6}{x^4}+\frac{120}{x^6}\,,$$

and

$$\int_x^\infty \frac{sin(t-x)}{t}\,dt\cong\frac{1}{x}-\frac{2}{x^3}+\frac{24}{x^5}\,.$$ (10 Marks)

البقية في الخلف

5- Let $0 = x_0 < x_1 < x_2 < x_3 = 1$, where $x_1 = \frac{1}{6}$ and $x_2 = \frac{1}{2}$ be a partition of the interval $[0, 1]$ into three subintervals. Furthermore, let $V_{h,0}$ be the space of continuous piecewise linear functions on this partition that vanish at the end points $x = 0$ and $x = 1$.

(a) Compute the stiffness matrix A defined by $A_{ij} = \int_0^1 \emptyset_i' \emptyset_j' \, dx$.

(b) Compute the load vector with $f(x) = 1$ defined by $b_i = \int_0^1 f \emptyset_i \, dx$.

6- Consider the problem

$$-u'' + u = f, \qquad x \in (0, 1)$$
$$u(0) = u(1) = 0,$$

(a) Choose a suitable finite element space V_h .

(b) Formulate a finite element method.

(c) Derive the discrete system of equations.

بالتوفيق

ا. د./ عبدالحي عزوز
د./صابرين جادالحق

Assiut University Faculty of Science Mathematics Department Term Exam	Computer Security Fourth Level (MC453) Time: 2 hours January 2020

Answer the following questions: (50 Marks)

Question 1: Answer the following questions: (10 Marks)

1-What is NIST definition for Computer Security?
2-Explain the term CIA Triad?
3- Mention some of the computer security challenges?

Question 2: Answer the following questions: (10 Marks)

1- Based on RFC 2828, mention the four kinds of threat consequences and list the kinds of attacks that result in each consequence?
2- Compare between passive and active attacks?
3- Write the X.800 and RFC 2828 definitions for security service?

Question 3: Answer the following questions: (10 Marks)

1-Explain the symmetric encryption ingredients?
2-Explain the methods used to attack symmetric encryption?
3-Explain DES?

Question 4: Answer the following questions: (10 Marks)

1- What are the general means of authenticating a user's identity?
2-What is NIST definition to the term malware?
3-Malware are mainly classified into two broadly categories. What are these categories? Discuss another method for malware classification?

Question 5: Answer the following questions: (10 Marks)

1-What is NIST definition for DoS attack?
2- Explain poison packet?
3- Explain cyberslam attack?

Dr. Tarik M. A. Ibrahim

Assiut University
Faculty of Science
Department of Mathematics

جامعة أسيوط
كلية العلوم
قسم الرياضيات

امتحان نهاية الفصل الدراسي الأول 2019/2020

الفرقة: الرابعة اسم المقرر: 412 ر تحليل مركب الزمن: ثلاث ساعات التاريخ: 2019/12/31

أجب عن جميع الأسئلة التالية: (درجة الأمتحان 50 درجة وكل سؤال 5 درجة)

1) أثبت أن الدالة $f(z)=|z|^2$ متصلة في المستوى المركب بأكمله.

2) أثبت أن الدالة $f(z)=R_e(z)$ ليست تحليلية في كل المستوى المركب.

3) كون الدالة التحليلية التى شقها الحقيقي هو $e^x(x\cos y - y\sin y)$ والتى تحقق الشرط $f(0)=0$.

4) إذا كانت $f(z)$ تحليلية داخل وعلى منحنى بسيط مقفل c برهن أن

$$\frac{f'''(a)}{3!}=\frac{1}{2\pi}\int_0^{2\pi} e^{-3i\theta} f(a+e^{i\theta})d\theta .$$

5) استخدم صيغ كوشي التكاملية في حساب $\oint_c \frac{e^{-iz}}{(z+i)^3}dz$ حيث c هو الدائرة $|z|=2$.

6) حقق معادلتي كوشي – ريمان للدالة $f(z)=z\,e^{iz}$.

7) أثبت أن المتسلسلة $\sum_{n=1}^{\infty}\frac{z^n}{n\sqrt{n+1}}$ منتظمة التقارب في $|z|\le 1$.

8) أوجد مفكوك لورنت للدالة $f(z)=\frac{e^z}{(z-i)^3}$ حول $z=i$ ثم أحسب $\oint_{|z|=3}\frac{e^z}{(z-i)^3}dz$.

9) استخدم التكامل الكنتوري في حساب $\int_{-\infty}^{\infty}\frac{dx}{x^2+36}$

10) استخدم نظرية المتبقيات في حساب $\int_0^{2\pi}\frac{d\theta}{2-\cos\theta}$

انتهت الأسئلة مع أطيب التمنيات بالتوفيق والنجاح

	Assiut University Faculty of Science Mathematics Dept.	Final Exam Theory of Computation Code : MC457	Date :31/12/2019 Level: fourth Time : 2 Hours	

Answer the following questions: **(50 Marks)**

Question 1: **(10 Marks)**

Read and Put (√) or (X):

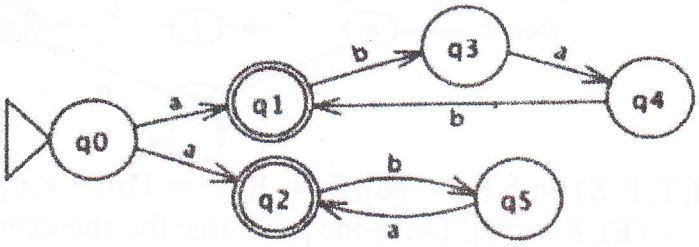
1) $L = \{0(11)^*\}$ is string of **0** followed by the set of all strings consisting of some number of concatenations of **11** with itself.
2) The set **{abb, a, b, bba}** is represented by **abb + a + b + bba.**
3) The set of all strings containing **11.** $(0 + 1)\,11\,(0 + 1)$.
4) Any element in **{1, 11, 111, ...}** can be obtained by concatenating **1** and any element of **{1}***. Hence $1(1)^*$ represents **{11, 111, ...}**.
5) The set $\{\Lambda, ab\}$ is represented by $\Lambda + ab$.
6) Concatenating **0**, any string over **{0, 1}** and **1**, can be represented by $0(0 + 1)^+ 1$.
7) If $x = 01, y = 101$ and $z = 011$, then $xyzy$ is **01101011101.**
8) If L is a regular language and F is a finite language, then $L \cup F$ must be a regular language.
9) The following grammar represent the language of all strings over the alphabet **a, b** with equal number of **a's** followed by equal number of **b's** $S \rightarrow aSb|aabb$.
10) A context-free grammar for generating the set of palindromes over the alphabet **a,b.** $S \rightarrow aSa|bSb|a|b\Lambda$.

(Hint: *Palindrome.* A palindrome is a string which is the same whether written forward or backward, e.g. baab.)

Question 2: **(10 Marks)**

1. Construct a NFA for the following regular expression $(a + b)^*aba(a + b)^*$

2. Give the regular expression and convert the following NFA to DFA: (Use subset construction method)



Question 3: **(10 Marks)**

Compute the minimum-state DFA for the following DFA:

	Final Exam **Topology and Differential Geometry** **Cod: 421 M** **Time: 2 hours** **Grade: 50 marks**	**Department of Mathematics** **Faculty of Sciences** **Assiut University** **Date: 31 December 2019**

Answer only five of the following questions:

Question (1): (10 Marks)

Let X be a non empty set and (X,τ) be a topological space .If $p\notin X$, prove that $\tau^{*}=\{\phi,U\cup\{p\},\forall U\in\tau\}$ is a topology on $X^{*}=X\cup\{p\}$.

If β is a base of the topology τ find a base β^{*} of τ^{*} .

Question (2): (10 Marks)

a) Supposed that $X=\{a,b,c,d,e\}$ and $A=\{a,c,e\}$. Define a topology that has a smallest possipile order such that $A^{\circ}=\{c,e\}, A'=\{b,e\}$ and hence find $ext(A)$, $b(A)$, $\overline{A}$.

b) Let (X,τ) be a topological space and $A\subseteq X$. Prove that $\overline{A}=A\cup A'$.

Question (3): (10 Marks)

a) For a topology $\tau=\{X,\phi,\{b\},\{a\},\{a,b\}\}$ on $X=\{a,b,c,d,e\}$, determine a largest subset $A\subseteq X$ such that $A^{\circ}=\{b\}, b(A)=\{c,d,e\}$

b) For a subset $A\subseteq X$ of a particular point space (X,P) find:

(i) $b(A)$ (ii) $N_q : q\neq p$

Please look the rest of quetions behind this page

أنظر بقية الأسئلة خلف الصفحة

4- Prove that the locus of the centers of osculating sphere at any point on the Helix its angle (θ), also is a Helix its angle is $\left(\frac{\pi}{2}-\theta\right)$, and Find the necessary and sufficient condition for the curve to be lie on a sphere. **(10 marks)**

5- a) show that a long a regular curve $\underline{r} = \underline{r}(S)$ of class ≥ 4,

$$\left[r'', r''', r^{(4)}\right] = k^5 \frac{d}{ds}\left(\frac{\tau}{k}\right)$$

and hence $\underline{r} = \underline{r}(S)$ is a general helix if and only if $\left[r'', r''', r^{(4)}\right] = 0$. **(5 marks)**

b) Show that for a curve lying on a sphere of radius a and such that the torsion τ is never 0 , the following equations satisfied

$$\left(\frac{1}{k}\right)^2 + \left(\frac{k'}{k^2\tau}\right)^2 = a^2 \qquad \textbf{(5 marks)}$$

6- a) Prove that any regular space curve is completely determined up to its position by its curvature function $k = k(S) > 0$ and its torsion function $\tau = \tau(S)$, (S - are length parameter). **(5 marks)**

b) Determine the intrinsic equation of the curve

$$\underline{X} = b \cosh\left(\frac{t}{b}\right)\underline{e}_1 + t\underline{e}_2 \ , \quad b = const \ . \qquad \textbf{(5 marks)}$$

انتهت الأسئلة مع أطيب الأمنيات بالنجاح

أ. د/ أحمد عبد المنصف علام د/ راوية عبدالرحمن حسين

Mathematics Dept. Faculty of Science Assiut University	Final Exam for Level 4 Subject: Scientific computing 1 Time: 2 Hours	1st Term 2019/2020 Date: 20-1-2020

Q1. a) Prove the least square formula between two variable X,Y as $y = a\,x^2 + bx + c$ (5 marks)

Answer:

b) The data in the following table between two variables x,y in the form $y = \frac{1}{a+b(\log x)+c\,(\log x)^2}$

a) Using the least square method to find a, b. (4 marks)

b) Find the equation between x,y (1 marks)

c) If x =5 find the corresponding value of y (1 marks)

d) draw a line of a best fit using least squares approximation for the following data(using matlab command only) (4 marks)

x	0.1	1	10	100
y	1	1/2	1/3	1/4

Q2. The data between the age of wife y and the age of the husband x (10 mark

1. Find the linear correlation coefficients.
2. Determine the type of the correlation

x	22	24	26	27	28	30	32	36	37	38
y	18	20	20	23	24	29	27	30	32	33

Q3 find the solution of the following equation by finite difference method

$$\ddot{y} + 2\dot{y} + y = x^2$$

(10 marks)

$$y(0) = 0.2, \quad y(1) = 0.8$$

Q4. Solve by the guass seidal for three iteration (10 marks)

$$20x + y - 2z = 17, 2x - 3y + 20z = 25, 3x + 20y - z = -18$$

Q5. Solve the following differential equation (5 marks)

$\frac{dy}{dx} = (x + y)y,\ y(0) = 1$ by using runge kutta method of order four to find y(1).

== Best Wishes ==

Dr Alaa Fahim