(درجات الامتحان: الدرجة الكلية 50 درجة موزعة على خمسة أسئلة بواقع 10 درجات عن كل سؤال – 5 درجات عن كل فقرة)

ملاحظة:- $\quad p = z_x$, $\quad q = z_y$, $\quad D_x = \frac{\partial}{\partial x}$, $\quad D_y = \frac{\partial}{\partial y}$.

أجب عن مما يأتي:-

1- أ) أوجد حلا للمعادلة التفاضلية $\frac{\partial}{\partial r}\left(r^2 \frac{\partial \varphi}{\partial r}\right) + \frac{1}{\sin\theta}\frac{\partial}{\partial\theta}\left(\sin\theta \frac{\partial\varphi}{\partial\theta}\right) = 0$ على الصورة $\varphi(r,\theta) = f(r)\cos\theta$ والذي

يحقق الشروط: $\frac{\partial\varphi}{\partial r} = -\cos\theta \ when \ r = a$, $\frac{\partial\varphi}{\partial r} \to 0 \ as \ r \to \infty$.

ب) أوجد الحل الكامل والحل المفرد -إن وجد – للمعادلة التفاضلية : $z^2(p^2 + q^2 + 1) = 1$.

2- أ) بطريقة فصل المتغيرات – أوجد حلا لمعادلة لابلاس: $z_{xx} + z_{yy} = 0$ بحيث يحقق الشروط :

(i) $z = 0$ عندما $y \to \infty$ أو $x = 0$ أو $x = \pi$, (ii) $z = \pi x - x^2$ عندما $y = 0$ لجميع قيم x في الفترة $[0, \pi]$.

ب) باستخدام التعويضات: $X = \frac{1}{x}$, $Y = \ln y$, $Z = \ln z$ عين الحل الكامل والحل المفرد -إن وجد- للمعادلة التفاضلية :-

$$x^4 p^2 - y z q - z^2 = 0 .$$

3- أ) أوجد الحل العام للمعادلة التفاضلية : $\left(D_x^2 + D_x D_y^2 - 2\right) z = e^{2x}\cos 3y + e^y \sin 2x$.

ب) اثبت أن الحل الكامل للمعادلة التفاضلية: $z = xp + yq + \sqrt{p^2 + q^2 - 1}$ يمثل مجموعة مستويات غلافها سطح زائدي قائم.

4- أ) أوجد الحل العام للمعادلة التفاضلية الآتية باستخدام طريقة أويلر:-

$$\left(x^2 D_x^2 - 2xy D_x D_y + y^2 D_y^2 - x D_x + 3y D_y\right)z = \frac{8y}{x} .$$

ب) باستخدام التعويض $Z = \ln z$ أوجد الحل الكامل والحل المفرد -إن وجد- للمعادلة التفاضلية:-

$$z^2(x + y) = p^2 + q^2 .$$

5- أ) أوجد الحل العام للمعادلة التفاضلية: $r - yp = -\sin x - y\cos x$, $(r = z_{xx})$.

ب) باستخدام تحويلات لابلاس – حل المعادلة التفاضلية : $y_{tt} - 4y_{xx} + y = 16x + 20\sin x$ والذي يحقق الشروط :-

$y(0,t) = 0$, $y(\pi, t) = 16\pi$, $y_t(x,0) = 0$, $y(x,0) = 16x + 12\sin 2x - 8\sin 3x$.

انتهت الأسئلة ،،،   د/ محمد عبدالله عبدالرازق

أجب عن الأسئلة الآتية: كل سؤال (10 درجات)

السؤال الأول: (أ) برهن أن الشرط الكافي لنقطة التشبع x^* (التي تكون المشتقات الجزئية للدالة مساوية للصفر) لكي تكون نقطة تطرف هو أن مصفوفة الهسين H تكون موجبة فأن النقطة تكون نهاية صغرى واذا كانت سالبة تكون نهاية عظمى .

(ب) اوجد نقط النهايات العظمى والصغرى للدالة $f(\underline{x}) = x_1 + 2x_3 + x_2 x_3 - x_1^2 - x_2^2 - x_3^2$.

السؤال الثاني : (أ) مستخدم الشرط الضروري من الرتبة الثانية حل المسألة التالية
$$Min \ f(\underline{x}) = (x_1 - 1)^2 + x_2$$
$$s.t \quad x_1 - x_2^2 \leq 0$$

(ب) أوجد مصفوفة الهسين للدالة $f(\underline{x}) = x_2^2 x_3 + x_1 e^{x_3}$ عند النقطة $\underline{x}^* = (2, -1, 3)$.

السؤال الثالث : أستخدم طريقة مضروبات لاجرانج في حل المشكلة التالية
$$Max \ f(x_1, x_2) = x_1^2 x_2 \quad S.t \quad g(x_1, x_2) = 2x_1^2 + 2x_1 x_2 - 12 = 0.$$
ثم طبق الشرط الكافي لمعرفة ان النقطة نهاية عظمى .

السؤال الرابع : (أ) بأستخدام طريقة خطوة الانحدار الشديد أوجد طول الخطوة α للدالة
$$f(\underline{x}) = 3x_1^2 + 2x_2^2 + 2x_1 x_2 + 7 \quad \text{ثم اوجد الحل عند} \ (x_1^0, x_2^0) = (1,2) .$$

(ب) بأستخدام طريقة تعديل المتغيرات أوجد القيمة الصغرى للدالة
$$f(\underline{x}) = 25x_1^2 + x_2^2 \ at(x_1^0, x_2^0) = (1,1)$$

السؤال الخامس : (أ) بأستخدام طريقة نيوتن اوجد القيمة الصغرى للدالة $f(\underline{x}) = 2x_1^2 + x_2^2 - 2x_1 x_2$
عندما $(x_1^0, x_2^0) = (5,5)$

(ب) استخدم دالة الجزاء (penalty) اوجد حل المسألة التالية $Min \ f(\underline{x}) = (x_1 - 1)^2 + (x_2 - 2)^2$
$$s.t \quad g(x) = x_1 + x_2 - 4 = 0$$

مع تمنياتي بالنجاح والتوفيق

د/ مصطفى علي الخطيب

Arab Republic of Egypt Ministry of Higher Education Assiut University Faculty of Sciences Department of Mathematics		Final Term Exam (2st Term) Second Semester of the year 2023/2024 Date: 23/5/2024 Time : 3 Hours
Course: Complex Analysis	Code: Math. 412	Testing degree: 50 marks

Answer only five of the following questions:

Question One: (10 marks = 4+3+3)

1. Define and give an example for each of the following: <u>Analytic Functions</u>, <u>Entire Functions</u>, <u>Meromorphic Functions</u>.

2. Show that $f(z) = \begin{cases} \dfrac{Re(z)}{z}, & z \neq 0 \\ 0, & z = 0 \end{cases}$ is <u>not continuous</u> at $z_0 = 0$.

3. Give an example with proof that shows that the following relationship $\log(z_1 z_2) = \log(z_1) + \log(z_2)$ is <u>not always true</u>, and when the <u>equality is true</u>.

Question Two: (10 marks = 3+3+4)

1. Find an upper bound for $\left| \dfrac{1}{z^4 - 5z + 1} \right|$, if $|z| = 2$.

2. Find the image of the line $x = 1$ under the complex mapping $w = z^2$, and illustrate this with a drawing.

3. By using contour integration, evaluate the integral $\displaystyle\int_0^{2\pi} \dfrac{1}{2 + \cos(\theta)} d\theta$.

Question Three: (10 marks = 4+3+3)

1. Calculate the value of the following expressions:

   (i) $\left(\dfrac{1-i}{1+i} \right)^{10}$ (ii) $(1-i)^{\frac{1}{2}}$ (iii) $(1+i)^i$

2. Let $f(z)$ be analytic inside and on a circle C of radius r and center at $z = a$. Prove <u>Cauchy's inequality</u> $\left| f^{(n)}(a) \right| \leq \dfrac{M.n!}{r^n}; n = 0,1,2,3,\ldots$, where M is a constant such that $|f(z)| \leq M$.

3. By using contour integration, evaluate the integral $\displaystyle\int_0^{\infty} \dfrac{x^2}{(1+x^2)^2} dx$.

Question Four: (5 marks = 3+3+4)

1. Study the existence of <u>the limit</u> $\lim\limits_{z \to 0} \left(\dfrac{z}{\bar{z}} \right)^2$.

2. Prove that the function $f(z) = \begin{cases} \dfrac{x^3(i+1) - y^3(1-i)}{x^2 + y^2}, & z \neq 0 \\ 0, & z = 0 \end{cases}$ satisfies <u>Cauchy–Riemann equations</u> at $z = 0$ but it is not <u>analytic function</u> at $z = 0$.

(1)

3. Evaluate the following integrals.

(i) $\oint\limits_{|z|=1} e^z \, dz$ 　　　　 (ii) $\oint\limits_{|z|=1} \dfrac{1}{z^2 e^z} \, dz$ 　　　　 (iii) $\displaystyle\int_0^{2\pi} \sin^2\left(\dfrac{\pi}{3} + 2e^{i\theta}\right) d\theta$

Question Five: (10 marks = 2+2+3+3)

1. Define and give an example for each of the following: <u>Isolated Singularities</u>, <u>Removable Singularities</u>, and <u>Essential Singularities</u>.

2. Evaluate the <u>residue</u> of $f(z) = z\cos\left(\dfrac{1}{z}\right)$ at $z = \infty$.

3. Find <u>Laurent series</u> about the indicated <u>singularity</u> for each of the following function:

$$f(z) = (z-3)\sin\left(\dfrac{1}{z+2}\right); \quad z = -2.$$

4. By using contour integration, evaluate the integral $\displaystyle\int_{-\infty}^{\infty} \dfrac{\cos(2x)}{x^2 + 4} \, dx$.

Question Six: (10 marks = 3+2+3+2)

1. Prove that $u = y^3 - 3x^2 y$ is <u>harmonic function</u>. Find the <u>harmonic conjugate function</u> of u.

2. Evaluate the integral $\oint\limits_C z^2 \, dz$ where C is the unit circle.

3. Let $f(z)$ be continuous in a simply connected region R and suppose that $\oint\limits_C f(z)dz = 0$ around every simple closed curve C in R. Then $f(z)$ is <u>analytic function</u> in R.

4. Using Cauchy's residue theorem, evaluate the integral $\oint\limits_C \dfrac{e^{2z}}{z^2(z^2 + 1)} \, dz; \quad C : |z + i| = \dfrac{1}{2}$.

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With best wishes,,, Prof. Dr. M. Azab Abd-Allah & Dr. Ayman Shehata

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(2)

		(2023/2024)
Assiut University		
Faculty of Science	**Final Exam of the 2nd Semester** **Mathematical Statistics**	Time: **3 h**
	For 4th Year Mathematics Students Instructor: **Prof. Abd EL-Baset A. Ahmad**	**50 Marks**

Answer the following questions: (10 mark for each question)

(1) (a) Let X and Y be discrete random variables with bpmf

y \ x	1	2	3
1	4/32	7/32	3/32
2	7/32	6/32	5/32

Find: (i) $f_{Y|X}(y|2)$ (ii) $F_{Y|X}(y|2)$ (iii) $V[Y|X=2]$

(b) Let the random variables X and Y have the bpdf

$$f_{X,Y}(x,y) = \begin{cases} e^{-y}, & 0 < x < y < \infty \\ 0, & o.w \end{cases}$$

Find $M_{X,Y}(t,s)$ and then use it to find $Cov(X,Y)$, and $\rho(X,Y)$.

(2) (a) $X_1, X_2, \dots, X_n$ is a random sample drawn from a population whose density function is Inverse Gaussian $IG(\mu, \lambda)$. Use the moment generating function given in the **helpful distributions and expressions** to show that the moment estimator of μ and λ are given by: $\hat{\mu} = \bar{x}$ and $\hat{\lambda} = \dfrac{n \bar{x}^3}{(n-1)S^2}$.

(b) If the bpdf of X and Y is given by

$$f_{X,Y}(x,y) = \begin{cases} 2, & 0 < x < y, \ 0 < y < 1, \\ 0, & o.w \end{cases}$$

Prove that: (i) $E[X|Y=y] = \dfrac{y}{2}$ (ii) $V[X|Y=y] = \dfrac{y^2}{12}$, $0 < y < 1$.

(3) (a) The pdf of a random variable X is given by $f_X(x) = \begin{cases} \dfrac{1}{3} e^{-\frac{x}{3}}, & x > 0, \\ 0, & o.w. \end{cases}$ and if the random variable Z is such that $Z = \begin{cases} 0, & X \notin A \\ 1, & X \in A \end{cases}$, where $A = \{x : 0 < x < 3\}$, then find the pmf of Z.

(b) Suppose that X and Y are independent random variables where $X \sim gamma(\alpha_1, \beta)$ and $Y \sim gamma(\alpha_2, \beta)$. Find the pdf of $Z = \dfrac{X}{X+Y}$

(4) (a) If $X_1, X_2, \ldots, X_n$ is a random sample of size n from a normal distribution with unknown parameters μ and σ^2. (i) Find the moments estimators and maximum likelihood estimators for the unknown parameters. (ii) Show that the sample mean $\overline{X}$ is a MVUE for μ.

(b) A civil engineer is analyzing the compressive strength concrete. Compressive strength is normally distributed with $\sigma^2 = 1000$ (psi)^2. Random sample of 12 specimens have a mean compressive strength of $\overline{x} = 3250$ psi. Construct 95% confidence interval on mean compressive strength. (use $z_{0.975} = 1.96$)

(5) Two observations are taken on a discrete random variable with pmf $p(x|\theta)$, where $\theta = 1$, or 2 given as

$p_{X|\Theta}$ \ θ	1	2
$p_{X|\Theta}(x_1|\theta)$	0.3	0.2
$p_{X|\Theta}(x_2|\theta)$	0.7	0.8

and the prior of θ is defined as

$$p_\Theta(\theta) = \begin{cases} 0.4, & \theta = 1, \\ 0.6, & \theta = 2, \\ 0, & o.w \end{cases}$$

Find the Bayes estimate for θ.

Helpful Formulas:

$$X \sim IG((\mu, \lambda) \Rightarrow M_X(t) = e^{\frac{\lambda}{\mu}[1-\left(1-\frac{2\mu^2 t}{\lambda}\right)^{\frac{1}{2}}]}$$
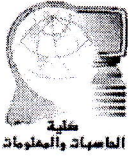
$$\overline{x^2} - \bar{x}^2 = \frac{(n-1)S^2}{n}$$

$$X \sim gamma(\alpha, \beta) \Rightarrow f_X(x) = \frac{\beta^\alpha}{\Gamma(\alpha)} x^{\alpha-1} e^{-\beta x}, \qquad x > 0.$$

$$X \sim N(\mu, \sigma^2) \Rightarrow f_X(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2\sigma^2}(x-\mu)^2}, \qquad -\infty < x < \infty.$$

Best wishes,,,   Prof. Abd EL-Baset Abdullah Ahmad

Final Exam
Faculty of Science
Fourth Level, Computer Science
الشبكات العصبية 459 رك
Date: 2024-06-01 , **Time: 2 hours**
THE EXAM IS IN TWO PAGES: 50 Questions

Q1- Choose true for the correct sentence and false for the wrong sentence (10 Marks)

1. Neural network is old field in computer science.
2. The aim of neural network is "Min loss function"
3. It is recommended to make large neural network to solve the classification problem.
4. Deep learning can be used in discovering new science.
5. The first layer in any deep learning network is maxpool.
6. The core of TensorFlow is using the concept the computational graph.
7. TensorFlow is better than pyTorch.
8. Large dataset is one of many reasons (أحد اسباب) for advancing the deep learning methods.
9. We can use personal laptop in training large neural network.
10. The activation function ReLU has a role in advancing the deep learning technique.

Q2. Assume that we next matrix. What are the results of max pool with 2x2 filter and stride 2. (5 marks)

$$[1\ 1\ 2\ 4$$
$$5\ 6\ 7\ 8$$
$$3\ 2\ 1\ 0$$
$$1\ 2\ 3\ 4]$$

What is the maxpool for this matrix?

Q3. (10 marks)

Assume that we have the next matrix

$$A = [1\ \ 1\ \ 1\ \ 0\ \ 0$$
$$0\ \ 1\ \ 1\ \ 1\ \ 0$$
$$0\ \ 0\ \ 1\ \ 1\ \ 1$$
$$0\ \ 0\ \ 1\ \ 1\ \ 0$$
$$0\ \ 1\ \ 1\ \ 0\ \ 0]$$

, and we have the filter

$$F = [0\ \ \ 0\ \ \ -1$$
$$0\ \ \ -1\ \ \ 0$$
$$-1\ \ \ 0\ \ \ 1]$$

What is Conv2D for the matrix A with the filter F?

PLEASE SEE THE NEXT PAGE

Q4. (12 marks)

   a) Write a function that express the output Z as function of X, W1, W2, W3
   b) Write the loss function using this neural network and the next table.
   c) Represent this network by Python Code.

X1	X2	Z
0	0	1
1	0	1
0	1	1
1	1	0

x_1

x_2

Z

$X \qquad W^1 \qquad W^2 \quad W^3$
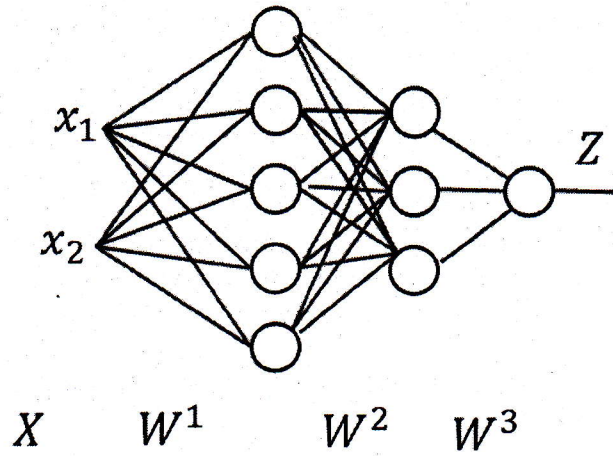
Q5 Solve the next problem with stochastic Gradient Descent (Two iterations) (8 Marks)

$$Min \; w_1 \, Sin \, (w_1 w_2)$$

Q6. Write about the real applications of GAN and autoencoder networks. (5 marks).

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End of Questions.   Best Wishes,   Ibrahim Elsemman

Computer Science Department
Faculty of Science
Assiut University
Final Exam
2023/2024

Course: Compilers theory
Code:
4th level
Time: 2 Hours
Marks:

- No. of pages: 4 - No. of questions: 3   answer all questions

Question 1 select the correct answer

[1] Which one of the following regular expressions represents the language: the set of all binary strings having two consecutive 0s and two consecutive 1s?

    a) (0|1)*0011(0|1)*| (0|1)*1100(0|1)*

    b) (0|1)*(00(0|1)*11|11(0|1)*00) (0|1)*

    c) (0|1)*00(0|1)*| (0|1)*11(0|1)*

    d) 00(0|1)*11|11(0|1)*00

[2] The RE in which any number of 0's is followed by any number of 1's followed by any number of 2's is?

    a) (0 | 1 | 2)*

    b) 0*1*2*

    c) 0* | 1 | 2

    d) (0 | 1)*2*

[3] Which of the following rules is NOT a correct context-free rule, where non-terminals are {A, B}, and terminals are {a, b}

    a) A → a | Ba   c) a → Ba

    b) AB → a   d) Both b and c

[4] What is the output of lexical analyzer?

    a) A set of RE

    b) Syntax Tree

    c) Set of Tokens

    d) String Character

[5] Parsing is also known as _____

    a) Lexical Analysis

    b) Syntax Analysis

    c) Semantic Analysis

    d) code generation

[6] Construct a NDFA for the following regular expression.

(a|b)*aba(a|b)*

a)

b)

c)

d) non of the above
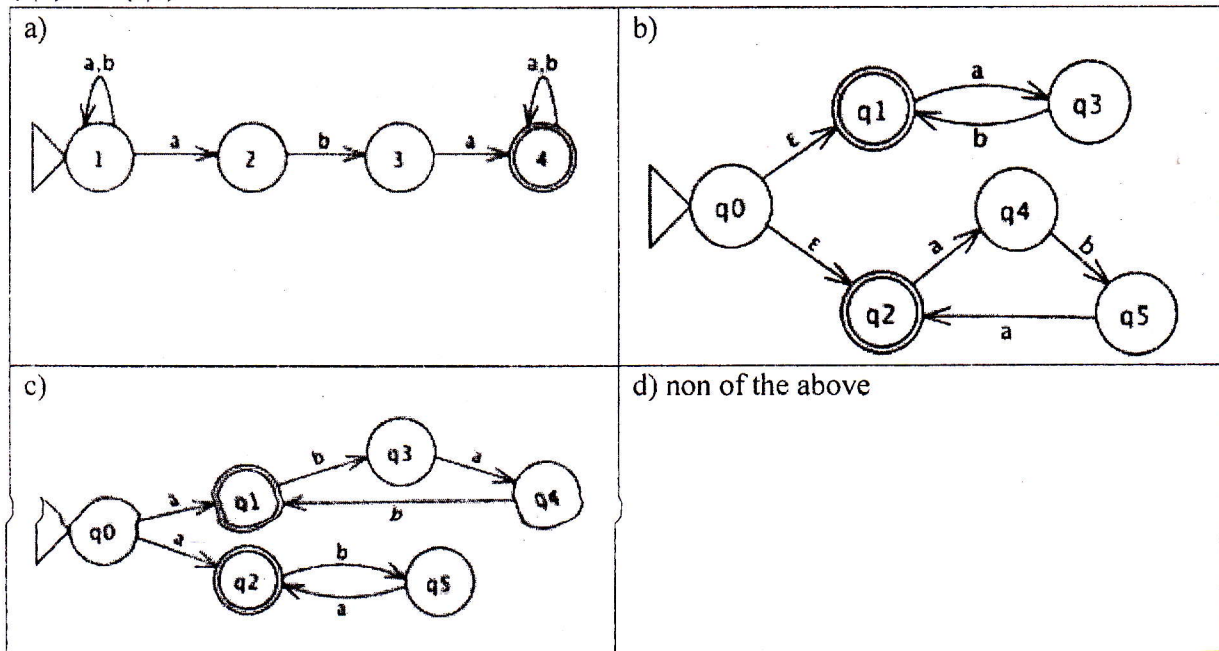
[7] The following grammar after removal of the left recursion will look like ....

expr → expr addop term|term
addop → +|-
term → term mulop factor | factor
mulop →*
factor →(expr) | number

A)
exp → term exp'
exp'→ addop term exp'|ε
addop → + -
term → factor term'
term' → mulop factor
term'|ε
mulop →*
factor →(expr) | number

B)
expr → expr addop
term|term
addop → +|-
term → term mulop factor |
factor
mulop →*
factor →(expr) | number

C)
expr → term expr (+|-) term
term → term * factor |
factor
factor →(expr) | number

[8] The set of all strings over ∑ = {a,b} in which strings consisting a's and b's and ending with in bb is
   a) ab   c) (a|b)* bb
   b) a*bbb   d) All of the mentioned

[9] When two parse trees are derived from the same grammar rules but both parse trees are different, this means, the grammar is ....
   a) Ambiguous
   b) Not LL(1)
   c) Not LR(0)
   d) Non ambiguous

الامتحان النهائي للمستوى الرابع للفصل الدراسي الثاني ٢٠٢٤/٢٠٢٣م

| الدرجة الكلية : ٥٠ درجة | التاريخ:٢٥/٥/ ٢٠٢٤ م | اسم المقرر: تحليل عددى (٢) |
| الزمن: ٣ ساعات | رمز المقرر: ٤٢٤ر |

Answer **five questions only** of the following:

1-a) Solve the following system

$$10x_1 + x_2 + 2x_3 = 13$$
$$x_1 + 10x_2 + 3x_3 = 14$$
$$3x_1 + 2x_2 + 10x_3 = 15$$

By the method of iteration.

b) Show that the process of iteration converges for the above system.

c) What is the maximum error after applying 13 iteration?.

2) Derive the recurrence relation of Chebyshev polynomial:

$$T_{n+1}(x) = 2xT_n(x) - T_{n-1}(x), \quad n = 1,2,.....,$$

Then prove that:

$$(i) \int_{-1}^{1} \frac{[T_i(x)]^2}{\sqrt{1-x^2}} dx = \frac{\pi}{2}, \quad \forall \ i \geq 1$$

$$(ii) T_i(x)T_j(x) = \frac{1}{2}\left[T_{i+j}(x) + T_{i-j}(x)\right]$$

For any positive **i** and **j** with $i \succ j$.

3) Derive Adams Bashforth two steps method:

$$y_{n+1} = y_n + \frac{h}{2}(3f_n - f_{n-1})$$

Then use this method to approximate y when x=0.3 for the particular solution of

$$y' = x + y, \quad y(0) = 1, \quad (h = 0.1)$$

من فضلك باقي الاسئلة في خلف الصفحة ⇐⇐⇐

4) Use the least squares method to find the approximate solution of the B.V.

Problem: $y'' + y = x^2 + 2, \quad y(0) = 0 \quad and \quad y(1) = 1,$

in the from $z(x) = a_0 + a_1 x + a_2 x^2$

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5) If the nonlinear system :
$$x_1^2 - 10x_1 + x_2^2 + 15 = 0, \quad x_1 x_2^2 + x_1 - 10x_2 + 6 = 0$$
is transformed into the fixed-point problem:
$$x_1 = g_1(x_1, x_2) = \frac{x_1^2 + x_2^2 + 15}{10}, \quad x_2 = g_2(x_1, x_2) = \frac{x_1 x_2^2 + x_1 + 6}{10}$$

(i) Show that, $G = (g_1, g_2)^t$ mapping $D \subset R^2$ into R^2 has a unique fixed-point in $D = (x_1, x_2)^t, \ 0 \le x_1, x_2 \le 2.5$

(ii) Apply functional iteration to find $x^{(1)}$ and $x^{(2)}$ $\left(x^{(0)} = (1.9, 1.1)^t \right)$

(iii) How many iterations have to be carried out to find the roots to within 10^{-7} ?

6- a) Prove that :

(i) If $g \in c[a, b]$ for all $x \in (a, b)$, then g has a fixed point in $[a, b]$.

(ii) If in addition, that g' exists on (a, b) and a positive constant $k \prec 1$ exists with $|g'(x)| \le k$ for all $x \in (a, b)$, then the fixed point in $[a, b]$ is unique.

b) Solve by shooting method the B. V. P.
$$y'' + y = 0, \quad y(0) = 0 \quad and \quad y(1) = 1,$$

Start with the initial approximations
$$\alpha_0 = 0.3 \quad and \quad \alpha_1 = 0.4 \quad to \quad y'(0), \ (h = 0.25)$$

Good Luck

Prof. A. El- SAFTY

أجب عن أربعة أسئلة فقط مما يلي:- (العظمي 50 وكل سؤال عليه 12.5درجة)

1-أذكر الخمس مراحل الاساسية للنمذجة الرياضية وناقش أحداها بالتفصيل .

2-استخدم النمذجة الرياضية في استنتاج:

1-المعادلة الموجية في بعد واحد من خلال وتر مهتز .

2-معادلة التوتر السطحي وأوجدها لفقاعة الصابون .

3-استنتج شرط استقرار مائع ثقيل فوق مائع خفيف تحت تأثير عجلة الجاذبية الارضية .

4- استخدم طريقة   K-B   لايجاد الحل التقريبى لنظام فيزيائي تذبذبي عندما يعتمد التردد الطبيعي للنظام علي الزمن .

5- اعتبر فئة النتائج الاتية:

x	0.00	1.00	2.00	3.00	4.00
y	0.99	0.03	-1.02	-1.94	-3.4

أوجد معاملات كثيرة حدود من الدرجة الاولي مرة ومن الدرجة الثانية مرة أخري مستخدما المصفوفات وطريقة المربعات الصغري ثم علق علي النتائج.

اعداد: ا د محمود حامد عبيد الله   مراجعة أ د جمال مختار محمود

with our best wishes

Important remarks	• No. of pages: 2 – Solve in Bubble Sheet. • 2 marks for each point.

Question no. 1: *Determine whether of these statements are true (T) or false (F)*   **(20 points)**

1) Measurement destroys the superposition.

2) The coefficients can always be rescaled by some factor to normalize the quantum state.

3) A qubit state has twice the probability of being $|1\rangle$ vs. $|0\rangle$, then the qubit state is $\sqrt{\frac{1}{3}}|0\rangle + \sqrt{\frac{2}{3}}|1\rangle$.

4) If 90 identical qubits in the state, $\sqrt{\frac{1}{3}}|0\rangle + \sqrt{\frac{2}{3}}|1\rangle$ then about 60 qubits will be measured as $|1\rangle$.

5) The outcome of a qubit measure is $|0\rangle$ so its initial state could be $|1\rangle$.

$$=======\text{If } X = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}, \; Y = \begin{pmatrix} 0 & -i \\ i & 0 \end{pmatrix}, \; Z = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}=======$$

6) Y is unitary and Hermitian.

7) $Y|0\rangle = i|1\rangle$

8) $Y|+\rangle + i|-\rangle = |0\rangle$

9) $YZ|0\rangle = ZY|0\rangle$

10) $\frac{1}{\sqrt{2}}(|+\rangle - |-\rangle) = |1\rangle$

Question no. 2: *Choose the correct answer*   **(30 points)**

11) Appling the quantum gates: $ZHX|0\rangle =$..........

   a) $|+\rangle$ b) $|-\rangle$ c) $|1\rangle$ d) $|0\rangle$

12) Appling the quantum gates: $ZHX|+\rangle =$..........

   a) $|+\rangle$ b) $|-\rangle$ c) $|1\rangle$ d) $|0\rangle$

13) The matrix $|1\rangle\langle 0|$ equals ......

   a) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ b) $\begin{pmatrix} 0 & 1 \\ 0 & 0 \end{pmatrix}$ c) $\begin{pmatrix} 0 & 0 \\ 1 & 0 \end{pmatrix}$ d) $\begin{pmatrix} 0 & 0 \\ 0 & 1 \end{pmatrix}$

14) The two-qubit state $\frac{1}{\sqrt{2}}$(..........) is entangled.

   a) $|01\rangle + |00\rangle$ b) $|01\rangle + |11\rangle$ c) $|00\rangle - |11\rangle$ d) $\frac{1}{\sqrt{2}}(|00\rangle + |01\rangle + |10\rangle - |11\rangle)$

15) Alice and Bob decide to compare the bit shown to determine if Eve was intercepting. They find that they do not agree. For this bit, what basis must Eve have used for her measurement?

   a) X   b) Z
   c) H   d) Not possible to tell from the given information.

Alice	Eve	Bob	Key
X	?	X	error
0	?	1	

16) Alice and Bob decide to compare the bit shown to determine if Eve was intercepting. They find that they do not agree. For this bit, what value must Eve have used for her measurement?

a) 0 b) 1
c) superposition of 0 and 1
d) Not possible to tell from the given information.

Alice	Eve	Bob	Key
Z	?	Z	error
1	?	0	

17) Alice and Bob decide to compare the bit shown to determine if Eve was intercepting. They find that they agree. For this bit, what basis must Eve have used for her measurement?

a) X b) Z
c) H d) Not possible to tell from the given information.

Alice	Eve	Bob	Key
Z	?	Z	1
1	?	1	

18) Which quantum property is preserved during teleportation?

a) Spin b) Momentum c) Energy d) Entanglement

19) Which quantum operation is performed after the Bell state measurement in the teleportation protocol?

a) Hadamard b) CNOT c) Phase d) Z and X

20) What is the number of qubits needed to teleport a qubit?

a) one b) two c) three d) four
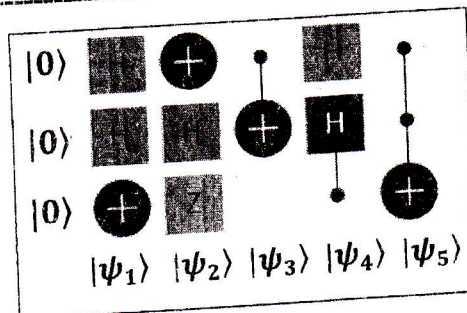
21) $|\psi_1\rangle = \frac{1}{2}(............)$

a) $|++1\rangle$ b) $|1++\rangle$ c) $|-+1\rangle$ d) $|+1+\rangle$

22) $|\psi_2\rangle = -\frac{1}{\sqrt{2}}(............)$

a) $|+01\rangle$ b) $|10+\rangle$ c) $|-01\rangle$ d) $|10-\rangle$

23) $|\psi_3\rangle = -\frac{1}{\sqrt{2}}|1\rangle(............)$

a) $|00\rangle + |11\rangle$ b) $|01\rangle + |10\rangle$ c) $|00\rangle - |11\rangle$ d) $|01\rangle - |10\rangle$

24) $|\psi_4\rangle = -\frac{1}{\sqrt{2}}|1\rangle(............)$

a) $|00\rangle + |11\rangle$ b) $|01\rangle + |10\rangle$ c) $|00\rangle - |11\rangle$ d) $|01\rangle - |10\rangle$

25) $|\psi_5\rangle = -\frac{1}{\sqrt{2}}(............)$

a) $|110\rangle + |011\rangle$ b) $|001\rangle + |101\rangle$ c) $|100\rangle + |011\rangle$ d) $|000\rangle + |111\rangle$

Dr. Moataz Elkhateeb

2/2

	Assiut University Faculty of Science Mathematics Dept.	Final Exam 2024 Course: Data mining Course code: MC464	Level: Fourth Time: 2 Hours Mark: 50	

FREE PALESTINE

"اسْتَعِــنْ بالله ولا تَعْجَــز"

الامتحان خمس (5) صفحات - الإجابة فى نفس الصفحة

Question 1: State the terminology of these definitions (10 Marks)

1. data objects that do not comply with the general behaviour or the model of the data.
   (...)

2. A type of attribute has a finite or countably infinite set of values.
   (...)

3. Data points that divide amount of data into exactly equal-sized consecutive subsets.
   (...)

4. A statistical measure which its major problem is its sensitivity to extreme (e.g., outlier) values.
   (...)

5. A repository of information collected from multiple sources, stored under a unified schema.
   (...)

Question 2: Put *True* or *False* for each of the following items (10 Marks)

1. The similarity between the two examples $x = (0,1,1,1,0,0,0,0,0,0)$ and $y = (0,0,0,0,0,0,1,0,1,1)$ where the ten attributes are symmetric binary is 0.4.
2. In ratio-scale attributes, the value 20 is considered the twice of 10.
3. In some experience, we measure the length of students, this length variable is considered ration-scale variable.
4. The confidence c of the rule $A \rightarrow B$ is the percentage of transactions in data set containing A that also contain B.
5. The dissimilarity between $X = (blue, Code\ A, farmer)$ and $Y = (red, Code\ A, doctor)$ is almost 0.66
6. Data integration is the process of combining multiple data sources in a single database.
7. Regression tends to predict the class label when these labels represent uncountable infinite values.
8. A major problem with the mean as a statistical representing is its sensitivity to extreme/outlier values.
9. Decision tree technique is used to discover association rules in a big data.
10. In interval-scale attributes, the value 200 is considered the twice of 100.

Question 3: Choose the correct answer (10 Marks):

1) The process carried out by a head of a school to place a new student transferred to this school in the excellent class or regular classes is called
   a) Classification
   b) Clustering
   c) Characterization
   d) mining frequent pattern

2) The entropy of this set $S_1 = \{A, A, B\}$ is
 a) $Ent(S_1) = 0$ b) $Ent(S_1) = 0.918$
 c) $Ent(S_1) = 0.159$ d) None of above

3) Grades corresponding to marks of students
 a) Interval-scale attribute   b) Ratio-scale attribute
 c) Nominal attribute   d) Ordinal attribute

4) In the unimodal curve, when the curve is skewed to the left, then it is ...
 a) Symmetric   b) Over symmetric
 c) Positively skewed   d) Negatively skewed

* For the following data set, suppose we need to cluster this data, using K-means algorithm, into **2** clusters, the <u>initial centers</u> are $C_1(0,0)$ and $C_2(1,1)$, and using <u>Manhattan distance</u>, answer the following No. 5 - 10

X	0	1	8	9
Y	0	1	64	81

5) The distance between $C_1(0, 0)$ and point $(8, 64)$ is
 a) 72   b) 70   c) 64.5   d) 63.5

6) The distance between $C_2(1, 1)$ and point $(9, 81)$ is
 a) 90   b) 88   c) 80.4   d) 81.5

7) After the first iteration, the two clusters are
 a) $\{(1, 1)\}$ and $\{(0, 0), (8, 64), (9, 81)\}$
 b) $\{(0, 0), (1, 1)\}$ and $\{(8, 64), (9, 81)\}$
 c) $\{(0, 0)\}$ and $\{(1, 1), (8, 64), (9, 81)\}$
 d) $\{(0, 0), (8, 64)\}$ and $\{(1, 1), (9, 81)\}$

8) After the first iteration, the values of new centers are
 a) $C_1(6, 48.6)$ and $C_2(0, 0)$ b) $C_1(1, 1)$ and $C_2(6, 48.6)$
 c) $C_1(0, 0)$ and $C_2(1, 1)$ d) $C_1(0,0)$ and $C_2(6, 48.6)$

9) After the second iteration, the two clusters are
 a) $\{(0, 0), (8, 64)\}$ and $\{(1, 1), (9, 81)\}$
 b) $\{(0, 0), (1, 1)\}$ and $\{(8, 64), (9, 81)\}$
 c) $\{(1, 1)\}$ and $\{(0, 0), (8, 64), (9, 81)\}$
 d) $\{(0, 0), (9, 81)\}$ and $\{(1, 1), (8, 64)\}$

10) After the second iteration, the values of new centers are
 a) $C_1(1, 1)$ and $C_2(6, 48.6)$ b) $C_1(0.5, 0.5)$ and $C_2(8.5, 72.5)$
 c) $C_1(0, 0)$ and $C_2(1, 1)$ d) $C_1(8.5, 72.5)$ and $C_2(0.5, 0.5)$

Question 4: Suppose you have the following data set with two attributes; **symmetric** Att. and **asymmetric** Att.   (10 Marks)

Compute the dissimilarity matrix for each two samples of this data set

Sample No.	Symmetric Att.	Asymmetric Att.
1	1	0
2	0	1
3	0	0
4	1	1
5	0	1

Hint: you must compute the dissimilarity matrix for the symmetric attribute alone, also for the asymmetric attribute, then compute the desired.

Symmmetric Dissim Matrix

	1	2	3	4	5
1					
2					
3					
4					
5					

Asymmetric Dissim Matrix

	1	2	3	4	5
1					
2					
3					
4					
5					

Final Dissim Matrix

	1	2	3	4	5
1					
2					
3					
4					
5					

Question 4: Suppose you have the following data set with two decision attributes and class label "**Evade**" which has two values "**YES**" and "**NO**".

id	Refund	Marital Status	Evade (Class label)
1	yes	Single	YES
2	no	Married	NO
3	no	Single	NO
4	no	Divorced	YES
5	no	Married	NO
6	yes	Divorced	NO
7	no	Married	YES
8	no	Married	NO
9	no	Single	YES

Classify the following example **X** based on this data set, using **Bayesian** classifier,
X = (Refund = "yes". Marital Status = "Married")   (10 Marks)
Show your answer through using these calculations like,

P(YES) = ...

P(NO) = ...

أكمل بذكر باقى المعادلات المستخدمة ولا يتم النظر للحسابات بدون ذكر المعادلات

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End of Exam, with my best wishes:
Dr- Abdel-Rahiem Ahmed Hashem Mohammed

د. عبدالرحيم أحمد هاشم محمد

Answer the following questios
Choose the correct answer   (50 pts)

1. The _____ format is usually used to store data.
a) BCD   b) Decimal
c) Hexadecimal   d) Octal
Answer:

2. The 8-bit encoding format used to store data in a computer is _____
a) ASCII   b) EBCDIC
c) ANCI   d) USCII
Answer:

3. A source program is usually in _____
a) Assembly language   b) Machine level language
c) High-level language   d) Natural language
Answer:

4. Which memory device is generally made of semiconductors?
a) RAM   b) Hard-disk
c) Floppy disk   d) Cd disk
Answer:

5. The ALU makes use of _____ to store the intermediate results.
a) Accumulators   b) Registers
c) Heap   d) Stack
Answer:

6. _____ are numbers and encoded characters, generally used as operands.
a) Input   b) Data
c) Information   d) Stored Values
Answer:

7. _____ bus structure is usually used to connect I/O devices.
a) Single bus   b) Multiple bus
c) Star bus   d) Rambus
Answer:

8. The I/O interface required to connect the I/O device to the bus consists of _____

a) Address decoder and registers
b) Control circuits
c) Address decoder, registers and Control circuits
d) Only Control circuits
Answer:

9. _____ is generally used to increase the apparent size of physical memory.
a) Secondary memory
b) Virtual memory
c) Hard-disk
d) Disks
Answer:

10. The time delay between two successive initiations of memory operation _____
a) Memory access time
b) Memory search time
c) Memory cycle time
d) Instruction delay
Answer:

11. The decoded instruction is stored in _____
a) IR
b) PC
c) Registers
d) MDR
Answer:

12. Which registers can interact with the secondary storage?
a) MAR
b) PC
c) IR
d) R0
Answer:

13. During the execution of a program which gets initialized first?
a) MDR
b) IR
c) PC
d) MAR
Answer:

14. Which of the register/s of the processor is/are connected to Memory Bus?
a) PC
b) MAR
c) IR
d) Both PC and MAR
Answer:

15. ISP stands for _____
a) Instruction Set Processor
b) Information Standard Processing
c) Interchange Standard Protocol
d) Interrupt Service Procedure
Answer:

16. The internal components of the processor are connected by _____
a) Processor intra-connectivity circuitry
b) Processor bus
c) Memory bus
d) Rambus
Answer:

17. _____ is used to choose between incrementing the PC or performing ALU operations.
a) Conditional codes
b) Multiplexer
c) Control unit
d) None of the mentioned
View Answer
Answer:

18. The registers, ALU and the interconnection between them are

2

collectively called as _____

a) process route

b) information trail

c) information path

d) data path

Answer:

19. _____ is used to store data in registers.

a) D flip flop

b) JK flip flop

c) RS flip flop

d) None of the mentioned

Answer:

20. The main virtue for using single Bus structure is _____

a) Fast data transfers

b) Cost effective connectivity and speed

c) Cost effective connectivity and ease of attaching peripheral devices

d) None of the mentioned

Answer: c

21. _____ are used to overcome the difference in data transfer speeds of various devices.

a) Speed enhancing circuitory

b) Bridge circuits

c) Multiple Buses

d) Buffer registers

Answer:

22. To extend the connectivity of the processor bus we use _____

a) PCI bus

b) SCSI bus

c) Controllers

d) Multiple bus

Answer:

23. IBM developed a bus standard for their line of computers 'PC AT' called _____

a) IB bus

b) M-bus

c) ISA

d) None of the mentioned

Answer:

24. The bus used to connect the monitor to the CPU is _____

a) PCI bus

b) SCSI bus

c) Memory bus

d) Rambus

Answer:

25. ANSI stands for _____

a) American National Standards Institute

b) American National Standard Interface

c) American Network Standard Interfacing

d) American Network Security Interrupt

Answer:

26. _____ register Connected to the Processor bus is a single-way transfer capable.

a) PC

b) IR

c) Temp

d) Z

Answer:

27. In multiple Bus organisation, the registers are collectively placed and referred as _____

a) Set registers

b) Register file

3

c) Register Block   d) Map registers
Answer:

28. The main advantage of multiple bus organisation over a single bus is
_____
a) Reduction in the number of cycles for execution
b) Increase in size of the registers
c) Better Connectivity
d) None of the mentioned
Answer:

29. The ISA standard Buses are used to connect _____
a) RAM and processor
b) GPU and processor
c) Harddisk and Processor
d) CD/DVD drives and Processor
Answer:

30. The duration between the read and the mfc signal is _____
a) Access time   b) Latency
c) Delay   d) Cycle time
Answer:

31. _____ is the bottleneck, when it comes computer performance.
a) Memory access time   b) Memory cycle time
c) Delay   d) Latency
Answer:

32. VLSI stands for _____
a) Very Large Scale Integration
b) Very Large Stand-alone Integration
c) Volatile Layer System Interface
d) None of the mentioned
Answer:

33. A memory organisation that can hold upto 1024 bits and has a minimum
of 10 address lines can be organized into _____
a) 128 X 8   b) 256 X 4
c) 512 X 2   d) 1024 X 1
Answer:

34. The RAMBUS requires specially designed memory chips similar to
_____
a) SRAM   b) SDRAM
c) DRAM   d) DDRRAM
Answer:

35. The reason for the implementation of the cache memory is _____
a) To increase the internal memory of the system
b) The difference in speeds of operation of the processor and memory
c) To reduce the memory access and cycle time
d) All of the mentioned
Answer:

36. To overcome the slow operating speeds of the secondary memory we

make use of faster flash drives.
a) True   b) False
Answer:
37. The fastest data access is provided using _____
a) Caches   b) DRAM's
c) SRAM's   d) Registers
Answer:
38. The memory which is used to store the copy of data or instructions stored in larger memories, inside the CPU is called _____
a) Level 1 cache   b) Level 2 cache
c) Registers   d) TLB
Answer:
39. In memory-mapped I/O _____
a) The I/O devices and the memory share the same address space
b) The I/O devices have a separate address space
c) The memory and I/O devices have an associated address space
d) A part of the memory is specifically set aside for the I/O operation
Answer:
40. The method of synchronising the processor with the I/O device in which the device sends a signal when it is ready is?
a) Exceptions   b) Signal handling
c) Interrupts   d) DMA
Answer:
41. The method which offers higher speeds of I/O transfers is _____
a) Interrupts   b) Memory mapping
c) Program-controlled I/O   d) DMA
Answer:
42. The interrupt-request line is a part of the _____
a) Data line   b) Control line
c) Address line   d) None of the mentioned
Answer:
43. A single Interrupt line can be used to service n different devices.
a) True   b) False
Answer:

44. The code sent by the device in vectored interrupt is _____ long.
a) upto 16 bits   b) upto 32 bits
c) upto 24 bits   d) 4-8 bits
Answer:
45. _____ register is used for the purpose of controlling the status of each interrupt request in parallel priority interrupt.
a) Mass   b) Mark
c) Make   d) Mask
Answer:
46. The logic operations are simpler to implement using logic circuits.
a) True   b) False
Answer:

47. The carry generation function: $c_{i+1} = y_ic_i + x_ic_i + x_iy_i$, is implemented in _____

a) Half adders

b) Full adders

c) Ripple adders

d) Fast adders

Answer:

48. In full adders the sum circuit is implemented using _____

a) And & or gates

b) NAND gate

c) XOR

d) XNOR

Answer:

49. In a normal adder circuit, the delay obtained in a generation of the output is _____

a) 2n + 2

b) 2n

c) n + 2

d) None of the mentioned

Answer:

50. The final addition sum of the numbers, 0110 & 0110 is _____

a) 1101

b) 1111

c) 1001

d) 1010

Answer:

امتحان نهاية الفصل الدراسي لجميع المستويات

المقرر: أخلاقيات المهنة والسلامة المهنية

رقم المقرر ورمزه: F300

الزمن: ساعتان

٣ يونيــة ٢٠٢٤

الاجابة في ورقة البابل

كلية العلوم جامعة اسيوط

السؤال الاول: في ورقة البابل ظلل (T) للعبارة الصحيحة أو ظلل (F) للعبارة الخاطئة لما يأتي: (٣٠ درجة)

١. الميثاق الأخلاقي: مجموعة من القيم التي تسعي المؤسسة للالتزام بها اثناء العمل.

٢. من مبادئ واخلاقيات مهنه التعليم الثقة والاحترام المتبادل

٣. اعترف اكثر عن علامات السلامة المهنية فهي لغة عالمية

٤. التخلص من مخلفات المعامل يكون بالحرق الآمن ودفن الرماد في مدفن آمن

٥. التقرير هو عرض كتابي او شفوي مركز لموضوع معين يقدمه فرد او مجموعه

٦. Code of Ethics تعني اخلاقيات المهنة والسلامة المهنية

٧. احرص على الجودة في عملك فالجودة لها سقف

٨. يعد سرقة علمية استخدم افكار من موقع على الانترنت والاشارة اليه

٩. معرفة علامات السلامة المهنية من المهارات المهنية المكتسبة للمقرر

١٠. ضرورة استخدام معدات الوقاية والسلامة الشخصية بعد العمل.

١١. يؤدي النهوض بالملكية الفكرية الي دفع عجلة التنمية الاقتصادية

١٢. الخبرة والسلامة من أخلاقيات البحث العلمي

١٣. أن تضيء شمعة صغيرة خير لك من أن تلعن الظلام.

١٤. احرص على التدريب فهو نشاط منظم لتحسين الأداء الوظيفي

١٥. الالتزام بالأخلاقيات يقوم السلوك، والاهتمام بالسلامة يحمي الحياة.

١٦. الدفاع عن شرف المهنة ليس من مبررات إفشاء الأسرار المختبرية

١٧. اللون الازرق في العلامات الارشادية يعني ممنوع

١٨. تعرف الكوارث بأنها حوادث غير مفاجئة لقوى الطبيعة او الانسان

١٩. عند حدوث الزلزال يجب تدريب العاملين

٢٠. المفاجأة و الاضطراب والارتباك ليست من سمات الطوارئ والازمات

٢٠. مخرج طوارئ	٢٩. مخاطر بيئية	٢٨. ممنوع الغطس	٢٧. مخاطر اشعاعية	٢٦. مخاطر بيولوجية	٢٥. اتجه يمين	٢٤. شباك	٢٢. ممنوع التدخين	٢٢. مخاطر الة حادة	٢١. حريق

السؤال الثاني: في ورقة البابل ظلل حرف A او B او C او D للإجابة الصحيحة: (٢٠ درجات)

٢١. مقرر اخلاقيات المهنة Scientific Ethics يتناول اخلاقيات مهنة (A- العلمين –B-الاطباء –C-المهندسين –D-كل ما سبق)

٢٢. من اساسيات تجهيز مختبرات الكيمياء (A- وجود شفاطات هواء ـ B- وجود كراسي ـ C- وجود سلالم-D- كل ما سبق)

٢٣.........هو كمية المادة التي تؤدي لوفاة نصف مستخدميها اذا تم تناولها دفعة واحدة (A-LD50 -B- LOL ـ C- LEL ـ D- LC50)

٢٤. من الآداب العامة لمزاولة مهنة المختبرات الطبية (A-الخبرة ـ B-الزهو ـ C-الدعاية الشخصية ـ D-كل ما سبق)

٢٥. مجموعه من الوظائف المتشابهة التي يمكن أن يقوم بها فرد واحد عند اللزوم (A- العمل ـ B- المهنة ـ C- الوظيفة – D-كل ما سبق)

٢٦. من الأساليب التي يمكن اللجوء اليها في ادارة الأزمة (A-المناورة والالتفاف-B-الضغوط الاقتصادية-C-الدبلوماسية-D-كل ما سبق)

٢٧. من طرق علاج الشائعات (A- المنطقية في التعامل ـ B- نشر الحقائق ـ C- التوعية ـ D-كل ما سبق)

٢٨. من الأهداف العامة التي تسعي السلامة والصحة المهنية لتحقيقها (A- حماية الممتلكات B- حماية الافراد – C- العمل بأمان –D- كل ما سبق)

٢٩. MSDS لأي مادة أو جهاز هامة لسلامة (A- الجهاز ـ B- المستخدم ـ C- المادة ـ D ـ كل ما سبق)

٤٠. من عوامل ادارة الازمة (A-اتخاذ القرار المناسب في الوقت المناسب ـ B-ضبط النفس ـ C-التدريب ـ D-كل ماسبق)

٤١. التبليغ فورا في حالة اكتشاف تحاليل ايجابية لمرض (A-الجرب – B- شلل الأطفال ـ C- الكوليرا – D ـ كل ما سبق)

٤٢. عدد الدرجات الوظيفية في الجامعات المصرية (A- ٤ ـ B- ٥-C- ٦ـ D- ٧)

٤٣. يجب ان تحتوى شنطة الاسعافات الأولية على (A- ملينات ـ B- مقلصات ـ C- قطن طبي وشاش ـ D- كل ما سبق)

٤٤. الرعاف هو (A-صدمة عصبية B- رعشة الجسم ـ C- نزيف دموي من الانف- D- كل ما سبق)

٤٥. من الخطوات الرئيسية عند تنفيذ عملية مواجهة الكوارث (A-الانذار والتحذير – B-الاخلاء -C-الايواء -D-كل ماسبق)

٤٦. من نفايات المعامل (A-اطباق مزارع بكتيرية ـ B-نفايات كيميائية ـ C-بقايا احياء بريه ـ D-كل ما سبق)

٤٧. من مجالات الاخلاقيات البيولوجية (A-تأجير الارحام ـ B-القرصنة البيولوجية –C- سرقة الجينات – D-كل ما سبق)

٤٨. من انواع الشائعات (A- الشائعة البطيئة – B- الشائعة السريعة ـ C- الشائعة الاستطلاعية ـ D- كل ما سبق)

٤٩. Plagiarism يعني (A-الانتحال-B-الاقتباس-C-البحث – D ـ كل ما سبق)

٥٠. من يعد ميثاق اخلاقيات المهنة ؟ (A- فريق عمل ـ B- رئيس المؤسسة ـ C- الطلابي- D- كل ما سبق)

Question # 1: (20 Marks) Answer this question in the down table   (2 marks/question)

1. Which of the following about the binomial distribution is not a true statement?

a. The probability of success must be constant from trial to trial.

b. The random variable of interest is continuous.

c. Each outcome may be classified as either "success" or "failure".

d. Each outcome is independent of the other.

Suppose that you have been given the following joint probabilities (answer the following 4 points)

	A1	A2
B1	0.50	0.20
B2	0.25	0.05

2. Determine $P(A2)$.

a. 0.25

b. 0.70

c. 0.75

d. 0.30

3. Determine $P(A2/B1)$.

a. 0.1857

b. 0.3857

c. 0.2857

d. 0.4857

4. Determine $P(A1 \cup B1)$.

a. 0.50

b. 1.45

c. 0.95

d. 0.25

5. Determine $P(A1 \cap B1)$.

a. 0.50

b. 0.7

c. 0.75

d. 0.25

6. You take a random sample of 500 students at your university and find that the median GPA is 3.25, then you are doing what branch of statistics?

a. Descriptive statistics

b. Population statistics

c. Inferential statistics

d. None of these choices.

7. Which of the following measures is affected most by extreme values?

a. The median.

a. The mean.

b. The mode.

c. The Range

8. The mathematics SAT scores of the seven students in a mathematics seminar are 533, 553, 578, 586, 619, 626, and 633. Suppose that the student with the score 633 drops the seminar and is replaced by a student with a score of 500. What will happen to the mean and median scores of the class?

a. The mean will increase; the median will be unchanged.

b. The median will increase; the mean will decrease.

c. Neither the mean nor median will change.

d. The mean and the median will decrease.

9. Which of the following measures is not a measure of central tendency?

a. The median.

b. The mean.

c. The mode.

d. The Range

10. In the notation below, X is the random variable, E and V refer to the expected value and variance, respectively. Which of the following is false?

a. $E(3X) = 3E(X)$

b. $E(X + 1) = E(X) + 1$

c. $V(0) = 0$

d. $V(X + 5) = 25 + V(X)$

11. Two event A and B are such that $P(A) = 0.5, P(B) = 0.3$ and $P(A \cap B) = 0.1$. then $P(A/B) = \ldots$

a. 1/3

b. 0.2

c. .15

d. 1

12. The outcomes of a random experiment or a stochastic process is defined as

a. Stochastic

b. Sample space.

c. Deterministic

d. Probability

Suppose that A manufacturer of computer chips claims that less than 10% of its products are defective. When 1,000 chips were drawn from a large production, 7.5% were found to be defective.

(Answer the following 4 points)

13. The population of interest is

a. production of computer chips

b. 1000

c. 10%

d. 7.5%

14. The Sample is

a. production of computer chips

b. 1000

c. 10%

d. 7.5%

15. The value which is referred to as parameter.

a. production of computer chips

b. 1000

c. 10%

d. 7.5%

Q	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A															

Question # 2: (10marks)

The following data represent the salaries (in thousands of dollars) of a sample of 10 employees of a firm:

$$10, 15, 13, 11, 10, 10, 15, 20, 15, 21.$$

a. Calculate the mean, median, and mode.

b. Calculate the range, variance, standard deviation, and coefficient of variation.

c. Describe the shape for the given set of data.

   Note: by studying the relationship between mean, median.

Question # 3: (10 marks)
A university found that 20% of its students withdraw without completing the introductory statistics course. Assume that 20 students registered for the course.

a. Using the binomial formula, find the probability that exactly four will withdraw.

b. Compute the expected number and the variance of withdrawals.

قســـم علوم الحاسب
كلــــية الحاسبات والمعلومات
جــامـعة اســـــيوط

أمن الحاسب
50 درجـــة

الـترم الثانى 2023\2024

Question 1 Choose the correct answer   **(40 points)**

1. Two parties are exchanging messages using public key cryptography. Which of the following statements describes the proper procedure for transmitting an encrypted message?
   a) The sender encrypts the message using the receiver's public key, and the receiver decrypts the message using the receiver's private key.
   b) The sender encrypts the message using the sender's public key, and the receiver decrypts the message using the receiver's public key.
   c) The sender encrypts the message using the sender's private key, and the receiver decrypts the message using the receiver's private key.
   d) The sender encrypts the message using the sender's public key, and the receiver decrypts the message using the sender's public key.

2. What will be the plain text corresponding to cipher text "SCSEMG" if rail fence cipher is used with key value 2?
   a) SSGECM
   b) SECMSG
   c) SSMCEG
   d) SECGSM

3. In RC4 cipher: Assume we use a 4 x 3-bit key of K = [1 2 3 6]. Which one is the S vector after applying two rounds of Key Scheduling Algorithm?
   a) S= [2 3 5 4 6 1 0 7]
   b) S= [2 1 3 6 4 5 0 7]
   c) S= [2 3 1 0 4 5 6 7]
   d) S= [1 3 2 0 4 5 6 7]

4. In RSA, euler $\Phi(n) =$ _____ in terms of p and q.
   a) p/q
   b) p*q
   c) (p-1)(q-1)
   d) (p+1)(q+1)

5. Encrypting the plaintext 9 using the superincreasing sequence {3, 4, 10, 20, 42} with n = 90, m = 17, will be _____
   a) 46
   b) 23
   c) 152
   d) 121

1

ers A and B use the Diffie-Hellman key exchange technique with a common prime p=23 and enerator g=5. If user A has private key XA = 6, user B has private key XB = 15.What is the shared secret key?
   a) 20
   b) 19
   c) 3
   d) 2

7. What will be the encrypted text corresponding to plain text "SANFOUNDRY" using columnar transposition cipher with the keyword "GAMES"?
   a) OSNNRUADFY
   b) SORAFUDYNN
   c) SNAUDNORFY
   d) ANFRSUNDOY

8. Encrypting the message "we are all together" using a double transposition cipher with 4 rows and 4 columns, using the row permutation $(1, 2, 3, 4) \rightarrow (2, 4, 1, 3)$ and the column permutation $(1, 2, 3, 4) \rightarrow (3, 1, 2, 4)$, will be _____
   a) LEALETHRAWERGTOE
   b) EALLTHERWEARTOGE
   c) LEAGETWTAHEOIRRE
   d) ETWTAHEOIEAGLRRE

9. In hill cipher, what will be the size of a key matrix if the plain text is "SECRET"?
   a) 1×6
   b) 5×1
   c) 6×1
   d) 6×6

10. The key space of triple DES when all three keys are independent, is
   a) 192
   b) 168
   c) 112
   d) 56

11. Suppose that an affine cipher is used to enciphers h as X and q as Y. which is the key?
   a) (5,10)
   b) (23,7)
   c) (9,12)
   d) (3,2)

12. In DES cipher, the round function F is _____
   a) $F (R_{i-1}, K_i) = \text{P-box}(\text{S-boxes}(\text{Expand}(R_{i-1}) \oplus K_i))$.
   b) $F (L_{i-1}, K_i) = \text{P-box}(\text{S-boxes}(\text{Expand}(L_{i-1}) \oplus K_i))$.
   c) $F (R_{i-1}, K_i) = \text{S-box}(\text{P-boxes}(\text{Expand}(R_{i-1}) \oplus K_i))$.
   d) $F (L_{i-1}, K_i) = \text{S-box}(\text{P-boxes}(\text{Expand}(L_{i-1}) \oplus K_i))$.

2

13. Which of the following is not a characteristic of a good hash function?
    a) Collision resistance
    b) Pre image resistance
    c) Reversibility
    d) Deterministic

14. Using the Playfair cipher, what will be the cipher text if the plain text is "HELLO WORLD" and the keyword is "CIPHER". (The filler letter is x)
    a) PHBSGSVQBGBY
    b) ECSPGSVQBGBY
    c) CISXSGQVGBYB
    d) PHBSSGVQGBYB

15. Using one time pad, the key that encrypts GLASS modulo 26 to yield ciphertext QJKES is:
    a) KYKMA
    b) KCKOA
    c) WUKWK
    d) JAXIT

16. Using the Caesar cipher, the encryption of the plaintext "guc" would be
    a) KYG
    b) DRZ
    c) MKY
    d) JXF

17. The Keystream bit after performing the shift of registers in A5/1 is computed by
    a) $x_{18} \oplus y_{21} \oplus z_{22}$
    b) $x_{19} \oplus y_{22} \oplus z_{23}$
    c) $x_{17} \oplus y_{20} \oplus z_{21}$
    d) $x_8 \oplus y_{10} \oplus z_{10}$

18. Vigenere table consists of _____
    a) 25 rows and 25 columns
    b) 26 rows and 26 columns
    c) 26 rows and 1 column
    d) 1 row and 26 columns

19. What is the minimum key length for a Vernam cipher?
    a) 128 bits
    b) 64 bits
    c) 56 bits
    d) The length of the plaintext message

20. For $p = 11$ and $q = 19$ and $e=17$. Applying RSA algorithm, the cipher text is _____ when the message=5.
   a) C=80
   b) C=92
   c) C=56
   d) C=23

Question 2 True or False   (10 points)

21. The Iris pattern is stable throughout a human lifetime, so that Iris is the best for authentication.

22. In the DES algorithm, although the key size is 64 bits, only 56 bits are used for the encryption.

23. In affine cipher, the value of "a" could be equal to 6.

24. RC4 cipher produce a keystream bit at each step.

25. Each of the eight DES S-boxes maps 6 bits to 4 bit.

26. The size of each DES S-box is 4×16 matrix.

27. For columnar transposition, if a ciphertext is 65 letters, it is easier to be broken if a 5×13 rectangle were used for the encrypting than 13×5.

28. In Simple Substitution "General Case", the key must be a shift of the alphabet.

29. RC4 is a stream cipher with a fixed key size.

30. A cryptographic hash function has variable output length.

Faculty of Science		Assiut university	
Course	Scientific computation (1)	Time allowed:	2 hours
Code:	MC451	Marks:	50
Level:	4	Date of Exam:	28 May 2024

Question # 1: Choose the correct answer (30 Marks)

- **Algorithm for newton forward method**

Step1: Input Y as ……………… in D matrix nxn

Step2: For …………. do Step 3 and Step 4.

 Step3: For ………… do step 4.

 Step 4: …………………..

Step5: Calculate S=……………..

Step6: Put sum = ………..and ss= ……….

Step7: for ……………. do step 8, Step 9

 Step 8 : ss= ss*…………

 Step9: $sum = sum + \frac{ss}{(i-1)!}$………

Step 10: $f_s = $ ………….

1. **First step** Y put as …….

 a) fist row   b) first column   c)Matrix   d)none of them

2. **Second step** for will take:

 a) i = 2 to n   b) i = 1 to n   c) i = 2 to n-1   d) i = 1 to n-1

3. **Third step** for will take:

 a) j=2 to n-(i-1)   b) j = 1 to n-i   c)j = 1 to n-(i-1)   d)none of them

4. **Fourth step** matrix D will be formed from the relation:

 a) $D_{j,i} = D_{j+1,i-1}-D_{j,i-1}$ b) $D_{j,i} = D_{j+1,i+1}-D_{j,i}$ c) $D_{j,i} = D_{j+1,i+1}-D_{j-1,i-1}$ d)none of them

5. **Fifth step** S =

 a) $S= (x_n - x_0)/h$ b) $S= (x - x_0)/h$ c) $S= (x_s - x_0)/h$ d)$S= (x_s - x_0)/n$

6. **Sixth step** sum and ss will be

 a) sum = $D_{1,1}$ and ss= 0   b) sum = $D_{1,1}$ and ss= 1   c) sum = 1 and ss= 1   d) sum =0 and ss= 0

7. **Seventh step** for loop will take

 a) i = 2 to n   b) i = 1 to n   c) i = 2 to n-1   d) i = 1 to n-1

8. **Eighth step** complete the dots

 a) (s-(i-1))   b) (s-(i-2))   c) (s-i)   d) (s-(i+2))

9. **Ninth step** complete the dots

 a) $D_{i,i}$ b) $D_{1,i}$ c) $D_{i,1}$ d) $D_{1,1}$

10. **Tenth step** the f_s at x_s will be

 a) $f_s = sum$ b) $f_s = D_{n,n}$ c) $f_s = ss$ d)none of them

Q	1	2	3	4	5	6	7	8	9	10
A										

Q₁

```
function [lagr] = lag(..........)

n=length(y);
lagr=0;
for i=1:n
  l=..........;
  for j=1:n
    if...........
        l=l*..................;
    end
  end
  lagr=lagr+...............;
end
```

Q₂

Q₃

Q₄

Q₅

11. The inputs for Lagrange method are

    a) x, y ,x0   b) x0,y0,z   c)l,y,x   d)none of them

12.Second dots, will be

    a) $L = 0$ b) $L = 1$ c) $L = 2$ d) none of them

13.The condition in the third dots will be

a)   if(i=0)   b)   if(i~=0)   e) if(i=j)   d) if(i~=j)

14.The missing part in Q₄

a) (x0-x(j))/(x(i)-x(j))   b) (x0-x(i))/(x(j)-x(i))   c) (x+x(j))/(x(i)+x(j))   d) none of them

15. The missing part in Q₅

a)   l+y(i)   b)   l*y(i)   c)   l/y(i)   d)   L+y(0)

Q	11	12	13	14	15
A					

Question # 2: write a MATLAB code to find the approximate of the following integral using Simpson's 1/3 method (5 Marks)

$$\int_0^1 \frac{1}{1+x^2}\, dx$$

Question # 3 Perform the following using Newton Raphson (5 Marks)
Write a MATLAB program to approximating the solution of the algebraic equation

$\cos(x) - 5x + 2 = 0.$,

x0 = 1, eps = 0.001

Dr.Amira Allam
With best wishes for success

Question # 4 (10 marks)

a) <u>Write a MATLAB code to find y(0.6) following differential equation by Modified Euler Methods</u>

$$\frac{dy}{dx} = x + y \quad , x = 0.2, \qquad y(0) = 1, \quad h = 0.2$$

b) <u>Write a M-file MATLAB to compute the Milne method   (hint: find y(0.1), y(0.2) and y(0.3) from Eular method).</u>

Dr.Amira Allam
With best wishes for success