getGPA(): float

tialize

BAYERO UNIVERSITY, KANO

FACULTY OF COMPUTING

CA Test for SWE2314: Computer Programming II 2020/2021 Session

Instruction: Answer All Questions

Time Allowed: 1 Hour

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1. (a) Write a code to declare two 2-dimensional arrays of type float, each of size 16×13. The elements in the first array are equal to square of sum of their indices variables, and the elements in the second array are three more than the positive differences between their indices variables. *7marks*

   (b) Write the code to display the contents of each of the two arrays. *4marks*

   (c) Write the code to add the two arrays and store the result in another array and display its content. *4marks*

2. (a) Consider the following function:

```
int func1(int x, int y){
        int flag = 1;
        for(int j=1; j<abs(y); j++)
                flag = flag*x;
        return flag;
}
```

   What is the output of the following C++ statements?

   i. cout<<func1(3, 5)<<endl; *2marks*

   ii. cout<<func1(2, -3)<<endl; *2marks*

   What does the function func1 do? *2marks*

   (b) Mention four items a programmer needs to know when using a predefined function. *3marks*

   (c) Define the term function prototype and explain how it is used in C++ to avoid compilation error. *3marks*

   (d) State three ways in which a computer processes a program. *3marks*

Wishing you all the best

24^{th} *Jan*, 2023

BAYERO UNIVERSITY, KANO

FACULTY OF COMPUTING

Department of Software Engineering

2020/2021 Second Semester Examination

SWE2314: Computer Programming II

Instruction: Answer Question ONE (1) and any other Four (4) Questions. Time: 3 Hours

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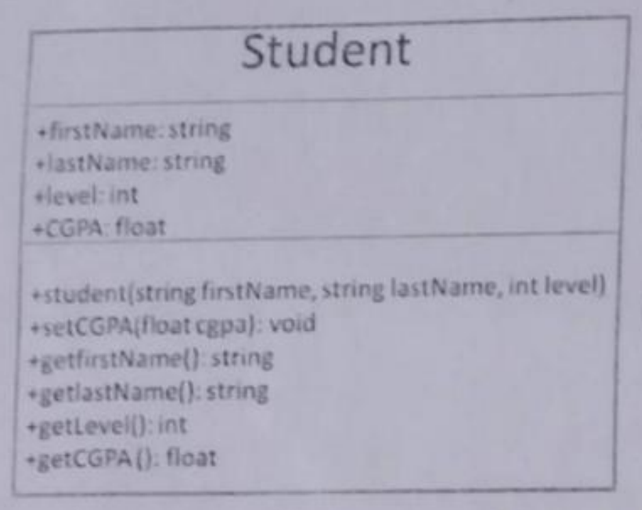
1. Consider the diagram below:



(a) Write the implementation of the class **Student**, implement the constructor to intialize some of the member variables, and implement all the member functions. [13*marks*]

(b) Create a function **display** that takes a student object and display its information using accessor functions. [3*marks*]

(c) In the main function, create two objects of the class, and use mutator functions to initialize the remaining member variable for each object. Call the display method for each object to show the information for each [6*marks*]

2. (a) There are two parts of C++ program that constitute the source code (.cpp file), mention them. [3*marks*]

(b) What is the difference between **break** and **continue**? [3*marks*]

(c) Write a program that can ask the user to provide a numerical value. The program should then identify the input and print a message to user telling him whether the value is positive, negative, or zero. For example, if the value is -5, then the program will display: -5 is negative. [6*marks*]

3. (a) **switch**, **case**, **break**, and **default** are reserved words in C++. Write the syntax of a *switch* selection structure to show how they are used. [4*marks*]

(b) Assuming that all variables are declared correctly, rewrite the following expressions using if...else statement. i. $(i < j)$? j = 20: j=3; ii. $(gender == "Male")$? name ="girl": name="boy"; [6*marks*]

(c) Mention the two types of statements in C++. Give example of each. [2*marks*]

4. (a) Write the syntax of a do .... while loop. [3*marks*]

(b) All the three iterative structures have their place in C++. What are the three steps for choosing the right looping structures? [6*marks*]

(c) Using the right looping structure, write the lines of code that can print all even numbers between 0 and 1000. [3*marks*]

5. Write a program to display the following:

(a)
```
.
..
...
....
.....
......
```
[4marks]

(b)
```
......
.....
....
...
..
.
```
[4marks]

(c) Write the general synatx of declaring two dimensional array. [2marks]

(d) What do you understand by array index out of bound? [2marks]

6. (a) The table below is to show the relationship between struct and array. Copy and complete the table. [5marks]

S/N	Aggregate Operation	Array	struct
1	Arithmetic	No	
2	Assignment		
3	Input/Output		
4	Comparison		
5	Parameter Passing	By reference	
6	Function returing a value		Yes

(b) With the aid of an example differentiate between member access operatior and a scope resolution operator. [4marks]

(c) Write the general syntax for declaring struct. [3marks]

7. (a) What do you understand by a recursive function? [2marks]

(b) Write a function that computes n!. Given that n! = n(n-1)(n-2)...1 for any non-negative integer n. [5marks]

(c) What is the output of the following code when the user input is 10? [5marks]

```
int newfunction(int k){
    if(k<=1)
        return k;
    else
        return newfunction(k-1) + newfunction(k-2);
}
int main(){
    int i = 0;
    int j;
    cout<<"Enter an Integer number ";
    cin>>j;
    while(i<j){
    cout<<newfunction(i)<<" ";
    i++;
    return 0;
}
```

BAYERO UNIVERSITY, KANO
FACULTY OF COMPUTING
DEPARTMENT OF SOFTWARE ENGINEERING
2020/2021 SECOND SEMESTER EXAMINATION
SWE2204: HUMAN COMPUTER INTERACTION (HCI)

Answer any four (4) questions **Time allowed: 2hrs**

1.
   a. When identifying a user profile according to HCI principles, you can use the questionnaire method if you know who the real users are. Discuss the questionnaire method. [4 marks]
   b. Give a detailed example of a user profile captured using a questionnaire [6 marks]
   c. Distinguish between user goals, tasks, and action in HCI. [5 marks]

2.
   a. Discuss mental model in brief. [4 marks]
   b. Explain two (2) points on what a mental model is good for? [6 marks]
   c. List five (5) characteristics of mental model. [5 marks]

3.
   a. Explain the following according to the principles of HCI design :
      i) visibility, (ii) consistency, and (iii) feedback [6 marks]
   b. Briefly explain design rationale. [4 marks]
   c. Give five (5) benefits of design rationale [5 marks]

4.
   a. What is usability testing? Give three (3) goals of usability testing. [6 marks]
   b. Distinguish between user-experience goals and usability goals. [5 marks]
   c. Explain the cognitive walkthrough as a usability inspection method [4 marks]

5.
   a. Explain the heuristic evaluation method [5 marks]
   b. Distinguish between when to use assisted evaluation and when to use non-assisted evaluation. [5 marks]
   c. Highlight five (5) usability inspection methods. [5 marks]

6.
   a. Briefly discuss HCI prototyping. [4 marks]
   b. Write short notes on (i) Low-fidelity prototype (ii) High-fidelity prototype. [6 marks]
   c. Explain five (5) benefits of the low-fidelity prototype. [5 marks]

Wishing you all the best *Monday 3rd March, 2023*

BAYERO UNIVERSITY, KANO
FACULTY OF COMPUTING
DEPARTMENT OF COMPUTER SCIENCES
2020/2021 SECOND SEMESTER EXAMINATION
MTH2205-LINEAR ALGERA I

Instruction: answer any four (4) questions Time Allowed: 2HRS

1.(a) Which of the set is or are linearly dependent or independent?

(i) $v_1=(1,2,3), v_2=(4,5,6), v_3=(7,8,9)$ [8 marks]

(ii) $v_1(x)=x^2-x+3,\ v_2(x)=2x^2+x+5$ and $v_3(x)=x^2+5x+1$ [8 marks]

(b) Determine all values of the constant k for which the vectors $v_1=(1,1,k)$, $v_2=(0,2,k)$, $v_3=(1,k,6)$ are linearly dependent in $\mathbb{R}^3$. [9 marks]

2. (a) Determine whether $u=(3,7,23)$ is linear combination of v_1, v_2, v_3 where $v_1=(1,3,7), v_2=(2,7,4), v_3=(2,6,5), u=(3,7,23)$ [12 marks]

(b) Determine whether $S=\{v_1,v_2,v_3\}$ span $\mathbb{R}^3$? Where $v_1=(1,2,3), v_2=(3,4,5)$, $v_3=(4,5,6)$ [13 marks]

3. Determine whether v_1, v_2, v_3 are basis for $\mathbb{R}^3$. If v_1, v_2, v_3 are not basis for $\mathbb{R}^3$, why?

(a) $v_1=(-1,1,1), v_2=(1,-1,1), v_3=(1,1,-1)$ [13 marks]

(b) $v_1=(1,2,-1), v_2=(2,-1,1)\ v_3=(8,1,1)$ [12 marks]

4. Determine whether

(a) $W=\left\{\begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{pmatrix} \in M_{22} : a_{11}, a_{12}, a_{21}, a_{22} \in \mathbb{Z}\right\}$ is subspace of M_{22} [12 marks]

(b) $W=\{(x,y,z): x,y,z \in \mathbb{R} \text{ and } z \geq 0\}$ is subspace for $\mathbb{R}^3$. [13 marks]

5. Let $V=\left\{\begin{pmatrix} a_{11} & a_{12} \\ 0 & a_{22} \end{pmatrix} : a_{11}, a_{12}, a_{22} \in \mathbb{R} \text{ and } a_{11} > 0\right\}$ with the usual matrix operations. Is V a vector space? If it is not, which properties failed to hold? [25 marks]

6. Let $V=\{(x,y): x,y \in \mathbb{R}\}$ with operations defined by $(x_1,y_1)+(x_2,y_2)=(x_1+x_2, y_1+y_2)$ and $c(x_1,y_1)=(cx_1,y_1)$. Is V a vector space? If not, why not?? [25 marks]

BAYERO UNIVERSITY, KANO

FACULTY OF COMPUTING
DEPARTMENT OF COMPUTER SCIENCE
2020/2021 Second Semester Examinations
CSC2204- (Design and Analysis of Algorithms)

Instruction: Answer any four (4) questions **Time Allowed**: 2 Hours

1. a. The efficiency analysis framework concentrates on the order of growth of an algorithm's basic operation count as the principal indicator of the algorithm's efficiency. To compare and rank such orders of growth, computer scientists use three notations. Define these three notations and give their mathematical and graphical representations. **(10 Points)**

   b. What is the General Plan for Analyzing the Time Efficiency of Non-recursive and Recursive Algorithms? Where do the two Plans differ? **(7.5 Points)**

2. a. An Algorithm is required to have unambiguous set of instructions and specify valid set of inputs, show how does Euclid's Algorithm for finding Greatest Common Divisor of two numbers possesses this requirement. Show the working of the algorithm using 30 and 12 as inputs. **(12.5 Points)**

   b. Consider the Middle-School Procedure for computing greatest common divisor, why the algorithm in its traditional form is not qualified as a legitimate algorithm? **(5 Points)**

3. a. Write down and discuss the Algorithm Sieve of Eratosthene. Show the working of the algorithm on $n = 20$. **(9.5 Points)**

   b. For each of the following algorithms, indicate (i) a natural size metric for its inputs, (ii) its basic operation, and (iii) whether the basic operation count can be different for inputs of the same size:

   I. computing the average of n numbers **(2 Points)**
   II. computing n/n! **(2 Points)**
   III. finding the smallest element in a list of n numbers **(2 Points)**
   IV. reverse a list of n numbers **(2 Points)**

4. a. Design an algorithm to find the sorted list from two sorted lists of numbers. For example, for the lists 2, 5, 7, 12, 13, 24 and 1, 6, 15, 17, 35, the output should be 1, 2, 5, 6, 7, 12, 13, 15, 17, 24, 35. What is the maximum number of comparisons your algorithm makes if the lengths of the two given lists are m and n, respectively? **(9 Points)**

   b. Assuming that an Algorithm running time $T(n)$ is defined by the function of n,

   i.e $T(n) = \frac{n^4}{3}\left(n^2 - \frac{1}{n^3}\right)$,

(where n is the metric indicating an input size). Prove that the algorithm will run 729 times longer when the input size is increased by three folds. **(8.5 Points)**

5. a. One of the ways to appreciate the qualitative difference among the orders of growth of the functions is to consider how they react to the increase in their input size, show that the logarithmic, linear and linearithmic functions increase by 1 unit, twofold and a little bit more than twofold respectively when the input size n is increased by twofold. **(7.5 Points)**

   b. The following algorithm searches for a given key k, in a given array A, discuss how the running time of this algorithm can be quite different for the same list of size n. **(10 Points)**

ALGORITHM *SequentialSearch*$(A[0..n-1], K)$
//Searches for a given value in a given array by sequential search
//Input: An array $A[0..n-1]$ and a search key K
//Output: The index of the first element in A that matches K
// or -1 if there are no matching elements
$i \leftarrow 0$
while $i < n$ **and** $A[i] \neq K$ **do**
  $i \leftarrow i + 1$
if $i < n$ **return** i
else return -1

6. a. A section of an algorithm would have the following nested loops performing three different summations as its basic operation, express them in mathematical summation form and simplify the resultant expression. State the order at which the algorithm runs.

```
"for i = 0 to n
   for j = i + 1 to n-1
    for k = j +1 to n-2"
```

(9.5 Points)

   b. Write down the expression that would be generated by the following recursive function for $n = 10$.

```
function sum(n) {
      if (n > 0){
            return n + sum(n-1)
} else {
      return 0
}
```

(8 Points)

BAYERO UNIVERSITY, KANO
FACULTY OF COMPUTING
DEPARTMENT OF SOFTWARE ENGINEERING,
2020/2021 SECOND SEMESTER EXAMINATIONS
SWE2315: SYSTEMS ANALYSIS AND DESIGN

Instructions: Attempt two (2) questions from section A and three (3) questions from Section B giving a total of five (5) questions in all. Time Allowed: 3 Hours

Section A: Answer any two (2) questions

1a. A system is composed of many components, mention three (3) of those Components. [3marks]
b. Write short notes on the following: [6marks]
i. Transaction Process System ii. Management Information System
c. Why is a System Analyst important when developing a new system? Discuss [5marks]

2a. A project is identified when someone in the organization identifies a business-need to build a system. Mention three (3) way in which business-need arises. [3marks]
b. Discuss three (3) stakeholders that would be relevant for software projects. [6marks]
c. What is a system request? List four (4) of its elements [5marks]

3a. Mention any three (3) criteria that can be used to select an SDLC [3marks]
b. Describe the three (3) areas of feasibility analysis. [6marks]
c. What is a work plan? Give an example of a work plan [5marks]

Section B: Answer any three (3) questions

4a.One of the most common mistakes made by new analysts is to confuse functional and nonfunctional requirements. Pretend that you received the following list of requirements: [7marks]

1. The system must allow registered customers to review their order history.
2. The system can run on handheld devices.
3. The system should allow students to view a course schedule while registering for classes.
4. The system supports 300 simultaneous users from 9-11 A.M
5. Only direct managers can see personnel records of staff
6. Company policy is to buy computers only from HP.

i. Which requirements are functional business requirements?
ii. Which requirements are nonfunctional business requirements? What kind of nonfunctional requirements are they?

b. In a tabular format, briefly compare any two (2) elicitations techniques in terms of depth of information covered and user involvement. [4marks]

c. Give an example of a closed-ended question, an open-ended question, and a probing elicitation question. [3marks]

5a. What are the three basic steps of the analysis process? Is each step performed in every project? Why or why not? [5marks]

b. Draw a use case diagram for Point of Sale (POS) machine using the scenario below: [6marks]

Due to the scarcity of money in Nigeria as a result of naira redesign, most transactions are now carried out using POS. A customer arrives at a checkout with items to purchase. The Cashier uses the POS system to login and record each purchased item. The System computes the total for the products. The customer enters payment information, which the system validates and record. The Cashier generates a receipt which the customer receives from the system and then leaves with the items.

c. Provide an activity diagram of any one of the use cases in (b) above [3marks]

6a. Describe any step of the design process in detail. [3marks]

b. *ATM are used by two users: Customer and Admin. Customers uses the ATM for various things such as logging into account, checking balance, transferring money to other customers and withdrawing money from account. Admin also login to load cash into the ATM and carryout maintenance activities.*

i. Provide use case descriptions of two (2) of the use cases from the description in b. [4marks]

ii. Draw a sequence or activity diagram for any functionality of the ATM. [3marks]

c. Draw a class diagram of the ATM in b. [4marks]

7. Using your Group Project System answer questions a-c.

a. Explain briefly how the requirements of your system are gathered. Mention one (1) business and user requirements each of your system. [6marks]

b. Draw a use case diagram to show the main functionalities of your system. [5marks]

c. Provide the architectural or user interface design of your system. [3marks]

Wishing you all the best

Friday 21st April, 2023

Bayero University, Kano

Faculty of Computing

Department of Computer Science

CSC2204 Design and Analysis of Algorithm Test: Answer all Questions. 1hr

1- Design an algorithm to find the sorted array from two sorted arrays of strings (listed in increasing order of their length). For example, for the array, A = [me, two, cake, taking, success] and B = [h, taken, successful, necessarianism, necessitousness] the output should be SA = [h, me, two, cake, taken, success, successful, necessarianism, necessitousness]. What is the maximum number of comparisons the algorithm would make in sorting the given two arrays A and B? What is the maximum number of comparisons your algorithm makes if the lengths of the two given arrays are m and n, respectively?

2- For each of the following algorithms, indicate (i) a natural size metric for its inputs, (ii) its basic operation, and (iii) whether the basic operation count can be different for inputs of the same size:

a. computing the average of n numbers

b. computing n/n!

c. finding the smallest element in a list of n numbers

d. reverse a list of n numbers

3- Assuming that an Algorithm running time T(n) is defined by the function of n, i.e $T(n) = \frac{1}{2}.n^3(n^2 - n)$, (where n is the metric indicating an input size). Prove that the algorithm will run 1024 times longer when the input size is increased by four folds.

BAYERO UNIVERSITY, KANO
FACULTY OF COMPUTING
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2020/2021 SECOND SEMESTER EXAMINATION
MTH2205-LINEAR ALGERA I

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3. Determine whether $v_1.v_2.v_3$ are basis for $\mathbb{R}^3$. If v_1,v_2,v_3 are not basis for $\mathbb{R}^3$, why?

(a) $v_1=(-1,1,1), v_2=(1,-1,1), v_3=(1,1,-1)$ [13 marks]

(b) $v_1=(1,2,-1), v_2=(2,-1,1)\ v_3=(8,1,1)$ [12 marks]

4. Determine whether

(a) $W=\left\{\begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{pmatrix} \in M_{22} : a_{11},a_{12},a_{21},a_{22} \in \mathbb{Z}\right\}$ is subspace of M_{22} [12 marks]

(b) $W=\{(x,y,z): x,y,z \in \mathbb{R} \text{ and } z\geq 0\}$ is subspace for $\mathbb{R}^3$ [13 marks]

5. Let $V=\left\{\begin{pmatrix} a_{11} & a_{12} \\ 0 & a_{22} \end{pmatrix} : a_{11},a_{12},a_{22} \in \mathbb{R} \text{ and } a_{11}>0\right\}$ with the usual matrix operations. Is V a vector space? If it is not, which properties failed to hold?

[25 marks]

6. Let $V=\{(x,y): x,y \in \mathbb{R}\}$ with operations defined by $(x_1,y_1)+(x_2,y_2)=(x_1+x_2,y_1+y_2)$ and $c(x_1,y_1)=(cx_1,y_1)$. Is V a vector space? If not, why not?? [25 marks]