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## BINGHAM UNIVERSITY FACULTY OF SCIENCE AND TECHNOLOGY COMPUTER SCIENCE DEPARTMENT SECOND SEMESTER EXAMINATIONS, AUGUST, 2018 CMP212 FUNDAMENTALS OF DATA STRUCTURES TIME ALLOWED: 2HRS **ANSWER ANY 3 QUESTIONS**

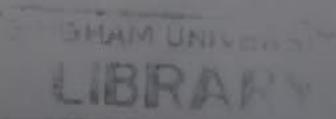
- 1 (a) What are the main differences between the int data type (integer) and the float data type?
  - (b) How can you represent the following numbers in scientific notation? (C++) (i) 3500 (ii) 0.00835
    - (iii) -D.000077 (iv)100000000
  - (c) Write the following numbers in the normal decimal notation (i) 705E-4 (ii) 9.2345E+5 (iii) -3E2
- What would be the best variable type for:
  - (a) the mass of an atom in milligrams?
  - (b) the number of cars at the car park?
  - (c) the name of a country's capital city?
  - (d) the first letter of the name of a university?
  - (e) in a single line of code briefly illustrate each of the above declarations in any programming language.
- 3. (a) Classify the following numbers as VALID or INVALID REAL numbers giving your reasons (C++).
  - (i) 49.6E5 (ii) 7.567E6 (iii) -8.146 (iv) 47.0E-04 (v) -45E+0.4 (vi) 0.004478 (vii) 3.698E.3
  - (viii) 5.1773E-4 (ix) -72E+2 (x) 6+7

- 49 GES
- (b) Write the above numbers in the normal decimal notation (where applicable).
- 4. (a) (i) Give and initialize a one-dimensional array named Y with 25 hypothetical elements of your choice where each element is not more than 20 in value.
- (ii) What is the sum of the first and last elements in your array?
- (iii) What is the value of Y (19)?
- (iv) What is the value of Y (8) Y (10)?
- (b) Give and initialize a two-dimensional array named X.

Fill a table of this array with numbers of your choice.

- (i) What is the sum of the first and last elements in your array?
- (ii) Given I=3 and J=4 what is the value of the X (J,I)<sup>th</sup> element in your array? [BASIC format]
- (iii) Given L = 2 and M=5 what is the value of X (L,M)?
- (iv) From your table, what is the value of X (3,3) X (4,4)?
- 5. "A Linked list is a very powerful, and very versatile, data structure, No matter what programming project you eventually undertake, it's very likely that you'll want to use a linked list at a point." Why are linked lists so popular and important?
- (I) Illustrate with a fully labelled diagram a singly linked list with 5 nodes.
- (II) Illustrate how you will implement an insertion of a new node between the first and second nodes.
- (III) Illustrate how you will delete the third node from the list.

Fully explain your answer in each case.



- (b) Given the following numbers
  - (i) 75e-3 (ii) -53e8 (iii) 3.414e+9

write them out as normal decimal numbers

- (c) Given the following numbers show how they will be represented in the memory of a 32-bit machine:
  - (I) -378.53 (II) 2100000 (III) 0.0000009

Show all working

- 4. (a) What is an array?
  - (b) Explain with examples the importance of arrays in computer programming
  - (c) Write briefly, with two appropriate examples each, your understanding of the following array types:
    - (i) One dimensional (ii) Multidimensional (iii) three dimensional
    - (iv) two dimensional
- (d) (i) Give and initialize a one-dimensional array named MARKS with 32 hypothetical elements (between 1 and 100) of your choice.

Using the C++ format:

- (ii) List MARKS(17), MARKS(22), MARKS(7), MARKS(32) in that order.
- (iii) What is the value of MARKS(8) + MARKS(28)?
- (a) Give and initialize a two-dimensional array named CMP with 8 columns and 10 rows.

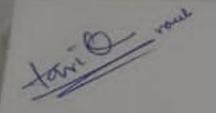
Fill a table of this array with numbers of your choice.

(i) What is the product of the first and last elements of your array?

Using the BASIC format:

- (ii) Given I=5 and J=8 what is the value of CMP (J,I)?
- (iii) Given L=6 and M=7 what is the value of CMP(L,M)?
- (iv) From your table, what is the value of CMP (5,7)/CMP(6,3)?
- (v) Give a short general program segment to implement the sum of all the numbers of the 4<sup>th</sup> row.
- (vi) Give a short general program segment to implement the average of all the numbers of the array CMP.

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FACULTY OF SCIENCE AND TECHNOLOGY DEPARTMENT OF COMPUTER SCIENCE

COURSE TITLE: FUNDAMENTALS OF DATA STRUCTURES
COURSE CODE: CMP 212 COURSE CREDIT UNITS: 2

TIME ALLOWED: 2 HRS

INSTRUCTION: ANSWER ANY THREE QUESTIONS

- 1. (a) Give your understanding of each of the following:
  - (i) Data types in general (ii) Primitive data type
  - (b) Why is it necessary to declare variables before using them in your program?
- (c) Explain with appropriate examples the following data types and the role they play in computer programming: int, float, bool, and char
- (d) Give the decimal equivalents of
  - (i) (88050e-4) \* (15.5e+3) (ii) -333e-8/(5e+5)
- (a) Distinguish among file, record and field using relevant examples to explain your answer.
  - (b). Given the following table of SALES (in NAIRA) identify and list

## **DEPARTMENTS**

Store	1 '	2	3	4	5
1	28720	80500	32110	15600	87500
2	21960	12230	25250	17450	95250
3 .	32570	10170	36860	19510	12700
1	36853	97352	67380	13750	92500
	69420	97420	90520	21650	25100
	78650	43250	87400	33600	74500

- (i) any three fields (ii) any three records (iii) the file
- (c) If the 32-bit machine representation of a number in memory is

What is the number? (show all working for full marks).

- (d) Write the following in C++ scientific notation
  - (i) 0.00000293 (ii) 55/8888
- 3. (a) Give the scientific notation of the following numbers:
  - (i) 0.00026 (ii) -0.0000000314 (iii) 290000000000

