April 2004

A6. Explain the differences between a static and a dynamic data structure, and provide an example of each. [4]

Static - The size of the data structure cannot be changed during program runs. [1]
E.g. Array [1]

Dynamic - The size of the data structure can be changed during program runs. [1]
E.g. Linked List [1]

Dec 2002

A2. For each of the following data items, state whether it is a variable or a constant, and whether it is best represented as a string, real or integer. (12 marks)

(a) The number of days in a year.
(b) The numbers of letters in the English alphabet.
(c) The height of a person.
(d) The number of kilometres in a mile.
(e) The name of the U.S. president in year 1995.
(f) The E-mail address of the last person to send you an email message.

(a) integer, variable (2 marks)
(b) integer, constant (2 marks)
(c) real, variable (2 marks)
(d) real, constant (2 marks)
(e) string, constant (2 marks)
(f) string, variable (2 marks)

(In each case, 1 mark for correct datatype, 1 mark for correct variable or constant. Max 12 marks)

December 2003

A6. Explain the difference between a constant and a variable. [2]

Constant—Read only variable, content cannot be changed during program runs. [1]
Variable—Content can be changed during program runs. [1]

B3. (c) Assume the following variables contain the values shown:

NUMBER-RED=100 NUMBER-BLUE=200
NUMBER-GREEN=300
DESCRIP-RED= “wagon” DESCRIP-BLUE= “sky”
DESCRIP-GREEN= “grass”

For each of the following Boolean expressions, decide whether the statement is ‘True’ or ‘False’ or ‘Illegal’.

(i) NUMBER-RED= NUMBER-BLUE
(ii) NUMBER-BLUE> NUMBER-GREEN
(iii) NUMBER-GREEN> NUMBER-RED
(iv) NUMBER-BLUE= DESCRIP-BLUE
(v) NUMBER-GREEN= “green”
(vi) DESCRIP-RED= “red”
(vii) NUMBER-BLUE= “blue”
(viii) NUMBER-RED<= NUMBER-GREEN
(ix) NUMBER-BLUE>=200
(x) NUMBER-GREEN>= NUMBER-RED+ NUMBER-BLUE [10]

(i) False [1] (reason: content of NUMBER-RED is not equal to that of NUMBER-BLUE)
(ii) False [1] (reason: content of NUMBER-BLUE is actually greater than that of NUMBER-GREEN
(iii) True [1]
(iv) Illegal [1] (data type not match → NUMBER-BLUE is int, but DESCRIP-BLUE is string)
(v) Illegal [1] (data type not match → you cannot assign a string value, “green”, to an int type variable, NUMBER-GREEN)
(vi) False [1] (reason: content of DESCRIP-RED is actually “wagon”, not “red”)
(vii) Illegal [1] (reason: same as part (v))
(viii) True [1]
(ix) True [1]
(x) True [1]

August 2003

B3. (a) A Pilot training school needs to computerize its records of the students waiting to enrol for training, in order to process them more efficiently. It has been decided to have a record for each student in the queue. Suggest the best data type for each of the following fields of such a record. [9]

(i) Name of student
(ii) Identification card number of student
(iii) Sex of student
(iv) Address of student
(v) Age of student
(vi) Weight of student
(vii) Past medical history of student
(viii) Particulars of next student in the queue

(i) String [1]
(ii) String [1]
(iii) char [1]
(iv) String [1]
(v) Integer [1]
(vi) Real [1]
(vii) String [1]
(viii) Pointer to record [2] [award [1] only if missing "record" or "pointer"]

April 2002

A5. Explain the difference between *data type* and *data structure,* and give **two** examples of each. [8]

Data type is a description of data items [2]
Data structure is the organised collection of items which can be of the same or different data types [2]

Examples of data type: [Any 2 of the following, 1 mark each]
Character
String
Integer
Real
Boolean
Pointer
date

(Do not accept numeric / non-numeric)

Examples of data structure: [Any 2 of the following, 1 mark each]
record
array
linked list
stack
queue