

## **M150B**

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### **Tutor-marked Assignment 1 - Fall 2010**

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**Cut-off date: December 7, 2010**

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This TMA should be submitted to your tutor electronically through the LMS system before the cut-off date indicated at the beginning of the TMA.

You should write your solutions to the questions in a single word document. Head the document with your name and your Personal Identifier.

This TMA assesses your understanding of Units 9, 10, 11, 12 and 14 of M150.

It consists of 5 questions. The total marks for each question are shown at the beginning of each question. The marks allocated to each part of a question are indicated in the margin.

You should be able to answer the questions of this TMA once you have completed the unit(s) each question covers.

Question 1: Unit 9

Question 2: Unit 9 & 10

Question 3: Unit 11 & 12

Question 4: Unit 14

Question 5: E-library skills

## Question 1 [20 marks]

1. You are required to model a new user-defined object type, `Account`. The `Account` object has the following properties:

`name`: a string that holds the account holder name.  
`balance`: a whole number that holds the account balance.

The `Account` object type has the following methods:

`getName()`: a method that returns the `name` of the `Account` object.  
`getBalance()`: a method that returns the `balance` of the `Account` object.  
`credit(anAmount)`: a method to add `anAmount` to the `Account` balance.  
`debit(anAmount)`: a method to debit the `Account` balance by `anAmount` only if `anAmount` is less than or equals to the `Account` balance. Otherwise keep the balance as it is.  
`display()`: a method which displays in an alert box the information about the `Account` object as shown below. The method should use the two methods `getName()` and `getBalance()`.



Using good programming style that helps readability, write JavaScript code to do the following:

- a. Write a constructor function for the `Account` object data type.
- b. Implement the methods `getName()`, `getBalance()`, `credit(anAmount)`, `debit(anAmount)` and `displayInfo()` according to the above specifications.
- c. Create an `Account` instance named `myAccount`, and initialize its properties as follows: `name` = a string representing your name, `balance` = 200.
- d. Using the appropriate methods, make the following transactions to `myAccount` in the given order:
  - Debit `myAccount` by 400 → Credit `myAccount` by 300 → Debit `myAccount` by 100.
- e. Use the method `display()` to show `myAccount` final state after making the transactions in d. Insert a screen dump showing the resulted alert box into your Solution Document.

## Question 2 [30marks]

In this question, you are going to use the Date library "dateLibrary.js" you've studied in unit 9. The specifications for all the functions in this library are in Appendix 1 at the end of unit 9.

You can get copy of the library from M150 course CD . Make sure that function library files reside in the same directory as your program file.

1. Write a JavaScript program to do the following: [11]
  - a) Prompt the user for their birth year, month and day. Assume that the user enters valid numbers and hence you do not need to do any error checking.
  - b) Create a `Date` object, `birthDay`, with the year, month and day given by the user.
  - c) Create a `Date` object, `today`, which represents today's date.
  - d) Use three appropriate functions from "dateLibrary.js" to:
    - i. Find the day name of `birthDay`.
    - ii. Display `birthDay` in long form.
    - iii. Calculate the age of the user in years by calculating the difference between `birthDay` and `today` in years.
  - e) Display the information in step d) in the output window as follows:

```
You were born on Monday, 22 May 1989
You are 21 years old.
```

2. Provide a copy of the specifications of the three functions you've used in writing your program. [3]
3. What information do we find in function specifications? [2]
4. Testing and debugging is an important stage in the software development process. [8]
  - a) Using your own understanding, briefly explain the difference between testing and debugging.
  - b) List the main techniques used in the process of testing software and others used when debugging it.
5. Briefly explain three types of documents that are written during the software development process. [6]

### Question 3 [25 marks]

1. List the four activities involved in the information loop. [4]
2. Identify which one of the information loop activities you've mentioned in 1 is involved in each of the following activities: [5]
  - a. Saving a bmp image file into gif format.
  - b. Writing a message and then sending it through a chatting program.
  - c. Receiving and then reading a message sent through a chatting program.
  - d. Opening your TMA pdf file saved in your computer to work out and solve the questions.
  - e. Explaining to your colleagues how to send the TMA through the LMS system.
3. Many computer users think that the user interface through which they communicate with the computer is the system. [6]
  - a. What are the features of a good user interface?
  - b. What are the impacts of having a poor UI system in an organization?
4. In the context of UI design, define the terms: visibility, affordance, feedback and simplicity. [4]
5. Figure 1 shows the interface of the Calculator program you have in your computer. State which of the design principles defined in 4 is demonstrated by the following features: [6]
  - a. Having labels representing numbers and mathematical operations on the buttons.
  - b. Mimicking the real-life calculator.
  - c. Having 3-D shadowed buttons.
  - d. Having a white bar that echoes the numbers pressed and shows the result.

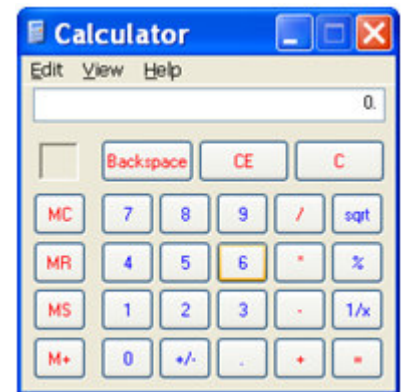


Figure 1 Calculator program

#### Question 4 [15 marks]

1. Briefly explain the main difference between symmetric key cryptography and asymmetric key cryptography. [2]
2. Mention an advantage and a disadvantage of asymmetric key cryptography. [3]
3. Use the One-time pad encryption method to decrypt the following message: [10]  
**FCCEQSHD**

Assume that the top page on the pad includes the following text:

**XBMORNYZAFGLBVYOPIDEGHJNMWWSAGUJLFVJTIEQAVCXKFKG**

Following is the alphabet numbering allocation you'll use:

<b>Character</b>	A	B	C	D	E	F	G	H	I	J	K	L	M
<b>Decimal</b>	1	2	3	4	5	6	7	8	9	10	11	12	13
<b>Character</b>	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
<b>Decimal</b>	14	15	16	17	18	19	20	21	22	23	24	25	26

Use the following table in your solution

<b>Cipher text</b>								
<b>Decimal</b>								
<b>One-Time Pad key</b>								
<b>Decimal</b>								
<b>Cipher text - key</b>								
<b>mod 26</b>								
<b>Plain text</b>								

### Question 5 [10 marks]

1. Log in to the E-library from your LMS system; follow the following sequence of links: Computing Math & Science → Electronic Journals → Computers & Applied Sciences Complete.

Now, use the **advanced search** link available to search for full text articles about HCI. These articles should be less than 30 pages, published in Academic Journals in the period from May 2010 to August 2010.

Select three articles from the results you've got. For each one of them write the following information:

- Article title.
- Authors names.
- Journal name.
- Volume and issue numbers.