



2nd Semester, 2020/2021

Course Code: CSE608

Time allowed: 2 Hrs.

Advanced Software Engineering

The Exam Consists of **Three** Questions in **Two** Pages.

Maximum Marks: 70 Marks

1 / 2

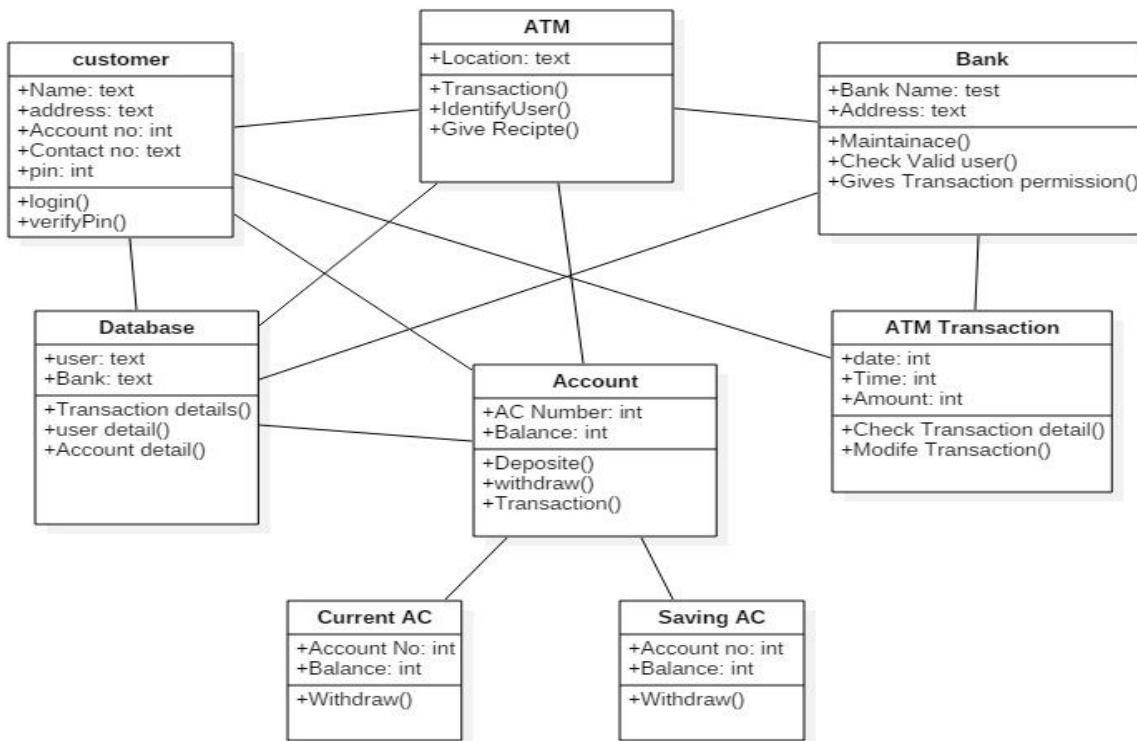
تعليمات هامة

- حيازة التيلفون المحمول مفتوحا داخل لجنة الامتحان يعتبر حالة غش وإذا كان من الضروري الدخول بالمحمول فيوضع مغلق في الحقائب.
- لا يسمح بدخول سماعة الأذن أو البلوتوث.
- لا يسمح بدخول أي كتب أو ملازم أو أوراق داخل اللجنة والمخالفه تعتبر حالة غش. يستثنى من ذلك الامتحانات ذات الكتاب المفتوح

Open Book Book

Question (1): [30 Marks]

The opposite class diagram shows a banking system where customers can use their credit/debit cards to make transactions within the ATM machine. Data base is a container that can correspond to one city or country for example.

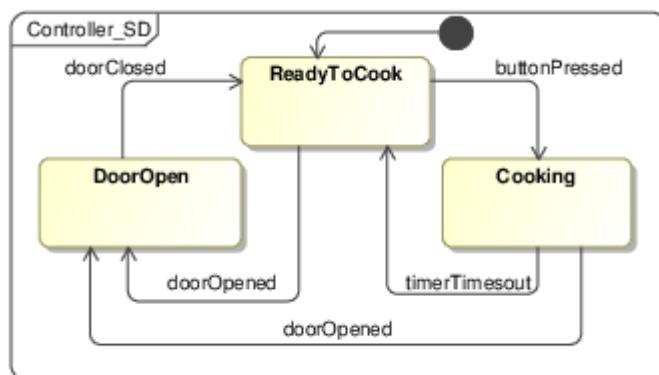


- For each association, write suitable numbers beside each class and show if it is a speacial one inherits, composite, or normal. **[6 Marks]**
- Draw an object diagram for two customers who have two saving accounts but one with more transactions than the other. **[6 marks]**
- If the class model is to be extended by adding create month statement for a given account, List all needed control and boundary classes **[6 marks]**
- For the above system create a possible use case diagram showing all possible actors and needed and important use cases **[6 marks]**
- Show a time sequence diagram that computes the balance of a given account between two given dates **[6 marks]**

Question (2): [20 Marks]

The following state transition diagram shows the behaviour of microwave oven

- a) List all events and actions [5 marks]
- b) Show the list of events and resultant state sequence required to put some food and cook it and then open it after it is done [5 marks]
- c) Show how can the state transition diagram be tested using state coverage method (list needed test cases) [5 marks]
- d) Repeat part (b) but using transition coverage method [5 marks]



Question (3): [20 Marks]

- a) Explain briefly with diagrams when possible the difference between

- I. The object and class model [4 marks]
- II. The prototyping model and extrem programming development models [4 marks]

- b) The following C program is used to show how to compute factorial of a given number

For example, Factorial of 5 is represented as $5! = 5 * 4 * 3 * 2 * 1 = 120$

```
/* C Program to Find Factorial of a Number Using For Loop */
#include <stdio.h>
int main()
{
    int i, Number;
    long Factorial = 1;
    printf("\n Please Enter any number to Find Factorial\n");
    scanf("%d", &Number);
    for (i = 1; i <= Number; i++)
    {
        Factorial = Factorial * i;
    }
    printf("\nFactorial of %d = %d\n", Number, Factorial);
    return 0;
}
```

- I. Draw CFG of the main function [4 marks]
- II. Compute the cyclometric complexity of it [4 marks]
- III. Create test cases to cover all branches of the main function [4 marks]

END of Exam, Good Luck

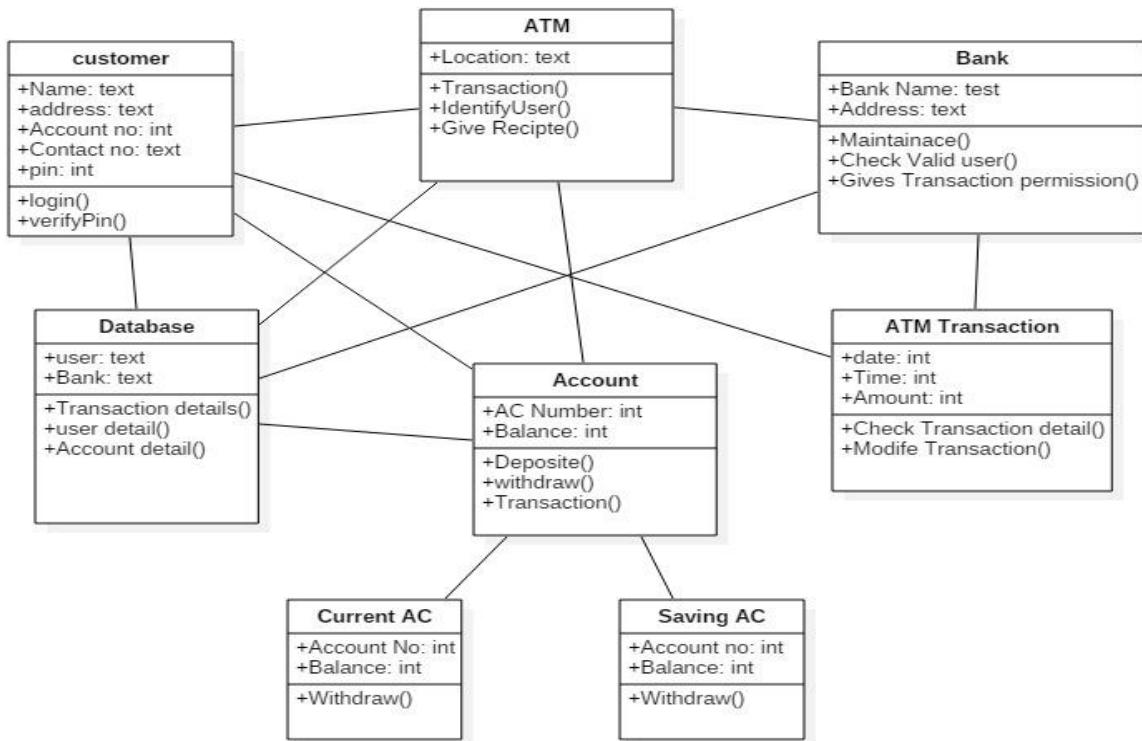
Final Exam Questions/ILO Matrix

	a1	a2	a3	a4	b1	b2	b3	c1	c2	c3
Q1	•	•	•		•	•	•	•	•	•
Q2	•		•		•	•	•	•		•
Q3		•		•		•	•		•	•

Model Answers

Question (1):

The following class diagram shows how the customers can order different items and pay for them using cash, credit cards or checks



- a) Explain whether a customer can pay for one order using two credit cards or not [5 Marks]

Yes he/she can pay using multiple methods/amounts each has its own type as the association between order and payment are 1 to 1..* and order could be any of the three types

- b) Draw an object diagram for two customers who ordered two similar orders containing the same items but one of them is paying in cash other paying in credit card [5 marks]

```

[:C1]----[:O1]---[:OD1]-----[:item1]
| ----[:OD2]-----[:item2]
|-----[:OD3]-----[:Item3]
|-----[:Payment1]----[:cash1]

```

```

[:C2]----[:O2]---[:OD4]-----[:item1]
| ----[:OD5]-----[:item2]
|-----[:OD6]-----[:Item3]
|-----[:Payment2]----[:credit1]

```

- c) If the class model is to be extended by adding search for items, customers and orders, show the needed control and boundary classes [5 marks]

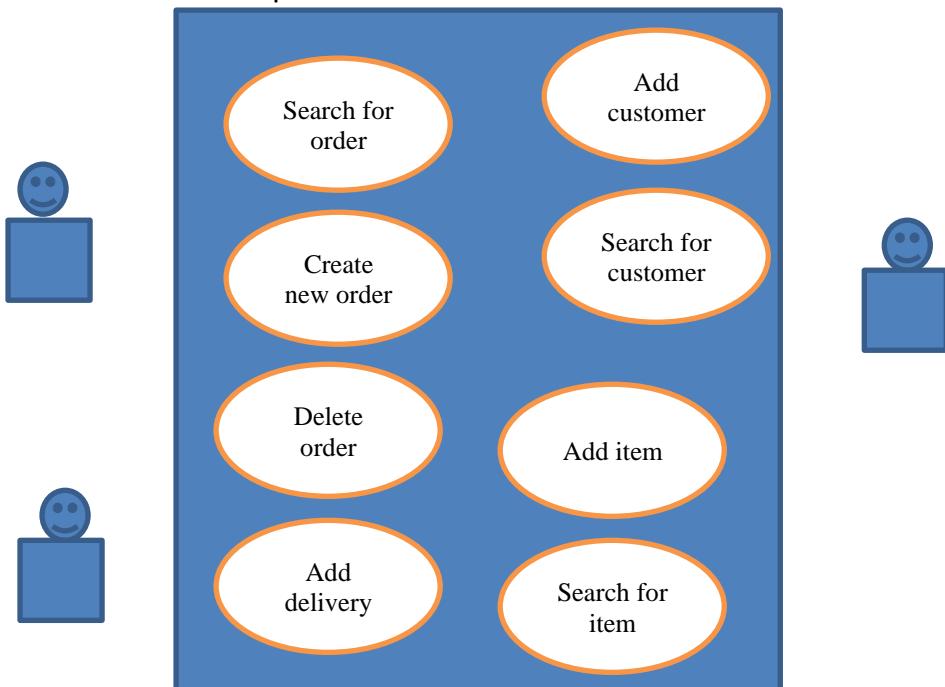
A control class is needed per use case so three control classes are needed for the three use cases and one boundary class is needed per use case per actor since we have just human actors so we need three boundary classes like “search forms”

Each search form and control will be linked to one of the three classes customer, order and item using dashed lines

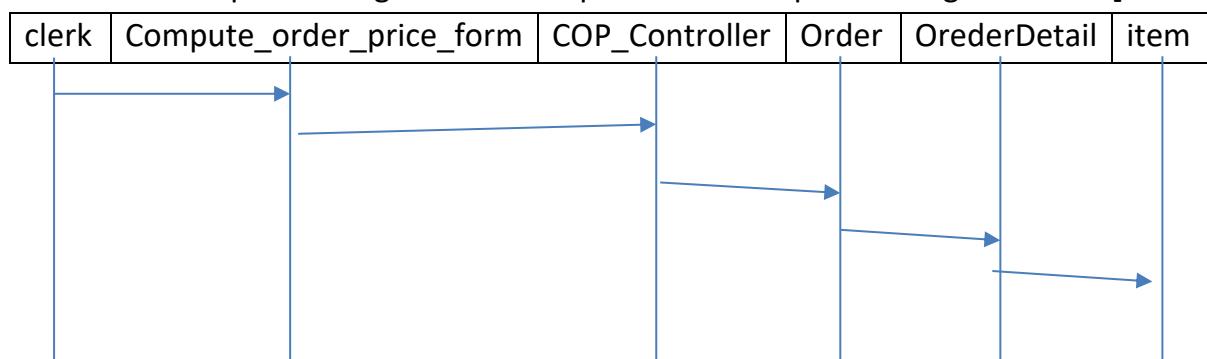
- d) Add one class for **delivery** which is used to show when an order is fulfilled. the delivery may contain more than one kind of items and could be delivered for at most one order Show the class details and how it is connected to the other existing classes [5 marks]

[order] --1-----1-*---[delivery]---1-----1-*---[Deliverydetail]---1---*---[item]

- e) For the above system create a possible use case diagram showing all possible actors and needed and important use cases [5 marks]



- f) Show a time sequence diagram that computes the total price for a given order [5 marks]



- g) Create one row of a CRUD matrix between the use case of *create_an_order* and the above data classes [5 marks]

Class	item	order	customer	orderdetail	Create_order_form	Create_order_controller
Create_a_n_order	R*	C	R/ C	C*	RCUD	RCUD

Question (2): [35 Marks]

The following table rows show the current state of a given microwave oven system, whereas the columns are the possible events that can happen the intersection between the row and the column is the next state starting from the current state and receiving an event. For example if the current state is **cooking** and **dooropened** event happened the next state will be **Cooking interrupted**

	buttonPressed	doorOpened	doorClosed	timerTimesOut
Ready To Cook	Cooking	Door Open		
Cooking		Cooking Interrupted		Cooking Complete
Cooking Complete		Door Open		
Cooking Interrupted			Door Closed	
Door Open			Door Closed	

- a) List two functional and two non-functional requirements about the controller of the oven system. [6 marks]

Functional 1: oven is switched on when needed

This is considered as liveness

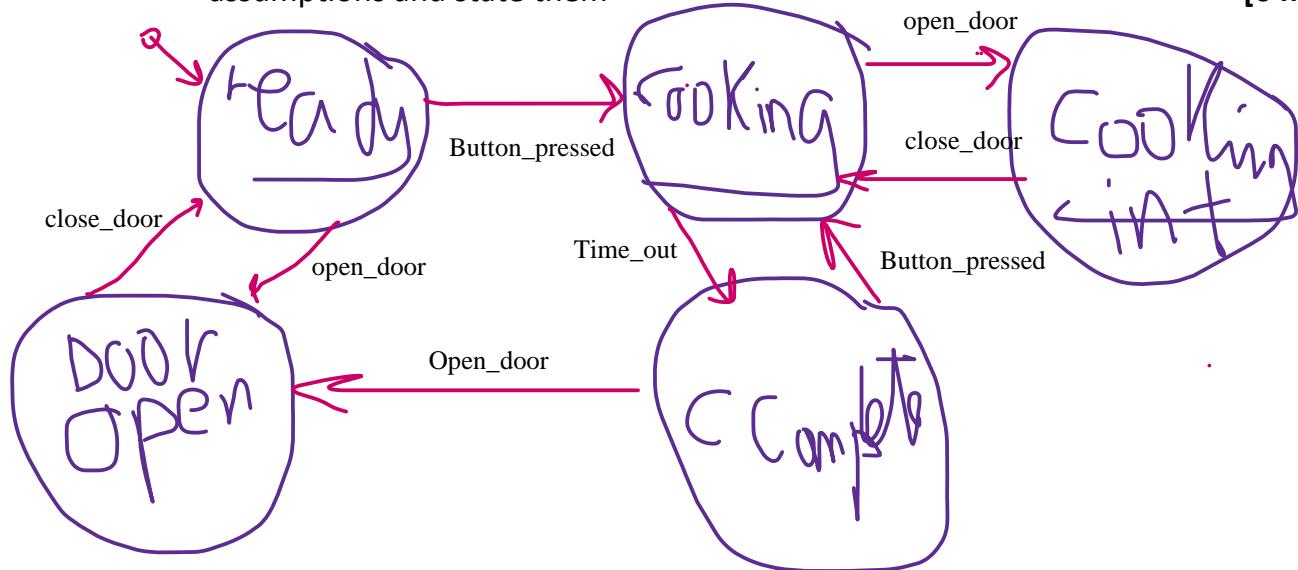
Functional 2: oven is switched off when needed or after some pre determined time
This is considered as controllable property as the food may be already cooked

Non functional 1: safety oven should not work if the door is open

For the safety when the door is open the oven should stop heating if it was working or if button pressed while the door is open it should not heat at all

Non functional 2: economy oven should work if it is empty

- b) Create a state transition diagram from the above table, make any needed assumptions and state them [6 marks]



- c) If the initial state is **Door open**, what is the shortest needed event list that move the system from the initial state to **cooking interrupted** state [5 marks]

Current state	Event	Next state
Door open	Close door	Ready to cook
Ready to cook	buttonpressed	Cooking
Cooking	Door opened	Cooking interrupted

- d) If a beep sound is needed to be produced as an action when start cooking show where to put this action on the state transition diagram [5 marks]

On the transition between ready to cook and cooking, also after door is closed from state cooking interrupted

- e) Show how can the state transition diagram be tested using state coverage method [4 marks]

Need to cover all states

Possibly three scenarios

- 1- normal operation till cooking complete
- 2- interrupt cooking
- 3- open door then close it and button pressed

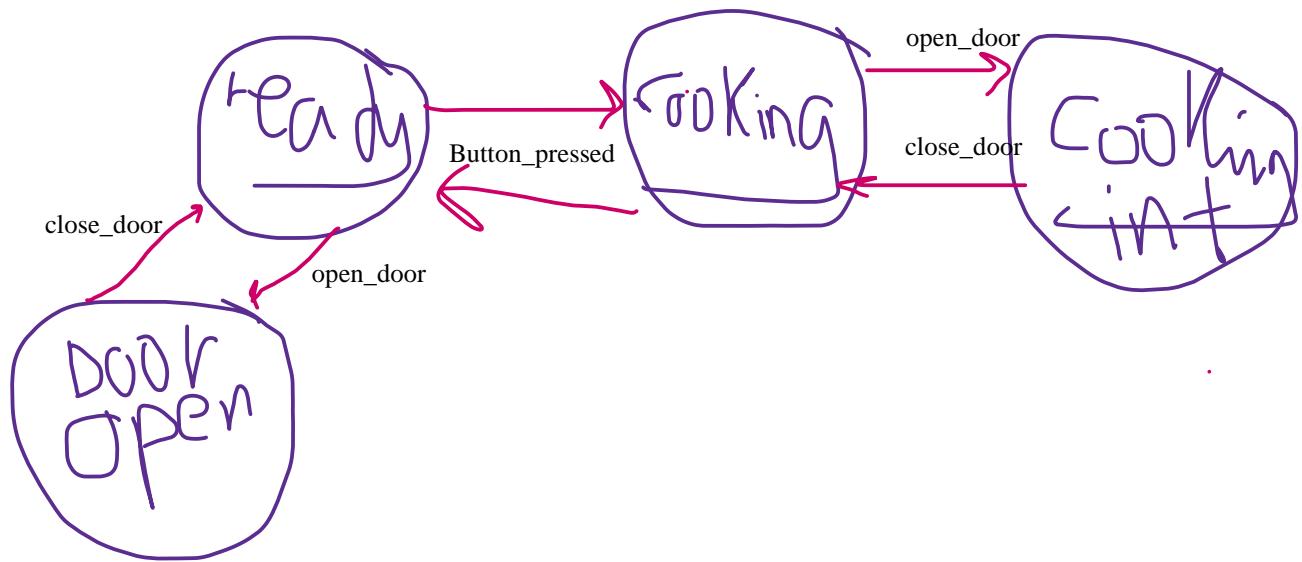
in each case the system should produce next state as expected in the table

- f) Repeat part (e) but using event coverage method [4 marks]

We need to cover all events at least once for each event. So door open is needed just once to be tested and button pressed should also be tested once as well

- g) Reduce the state transition diagram if there is no timer; add some indeterminism to compensate for not knowing when the cooking job is done [5 marks]

There will be no cooking complete state but the system will possibly return to ready to cook state



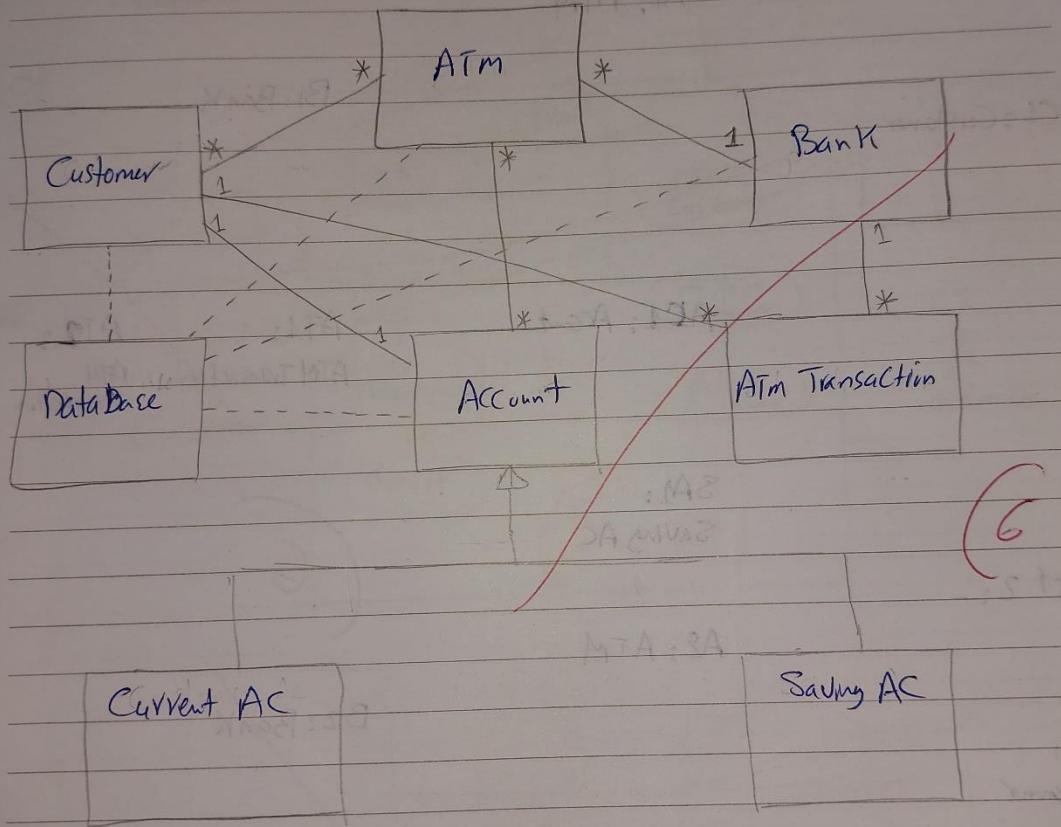
<p>STUDENT EXAMINATION OFFICE</p>	<p align="center">AIN SHAMS UNIVERSITY FACULTY OF ENGINEERING</p> <p align="center"> 1839</p> <p align="right">29405262500691</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td>BN 33</td> <td>CSE608</td> <td>Hall Exam Zone 30</td> </tr> <tr> <td colspan="3">1 9 8 1 1 2 4 2</td> </tr> <tr> <td colspan="3">PLEASE MAKE SURE THAT THE SHOWN NUMBER IS THE SAME IN THE SIGNATURE SHEET</td> </tr> <tr> <td colspan="3">Proctor's Signature</td> </tr> </table> <p>ASU Engineering Electrical 26 JUN 2021 EPM-ECE-CSE</p>	BN 33	CSE608	Hall Exam Zone 30	1 9 8 1 1 2 4 2			PLEASE MAKE SURE THAT THE SHOWN NUMBER IS THE SAME IN THE SIGNATURE SHEET			Proctor's Signature																										
BN 33	CSE608	Hall Exam Zone 30																																			
1 9 8 1 1 2 4 2																																					
PLEASE MAKE SURE THAT THE SHOWN NUMBER IS THE SAME IN THE SIGNATURE SHEET																																					
Proctor's Signature																																					
<p>INSTRUCTOR</p>	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Question Number</th> <th>Mark</th> <th>Signature</th> </tr> </thead> <tbody> <tr><td>1</td><td>28</td><td></td></tr> <tr><td>2</td><td>20</td><td></td></tr> <tr><td>3</td><td>16</td><td></td></tr> <tr><td>4</td><td></td><td></td></tr> <tr><td>5</td><td></td><td></td></tr> <tr><td>6</td><td></td><td></td></tr> <tr><td>7</td><td></td><td></td></tr> <tr><td>8</td><td></td><td></td></tr> <tr> <td>Total</td> <td>64</td> <td></td> </tr> </tbody> </table> <p align="right">Total Mark 64 70</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td>First Marker</td> <td>Name Dr. Ishw</td> <td>Signature</td> </tr> <tr> <td>Second Marker</td> <td></td> <td></td> </tr> </table>	Question Number	Mark	Signature	1	28		2	20		3	16		4			5			6			7			8			Total	64		First Marker	Name Dr. Ishw	Signature	Second Marker		
Question Number	Mark	Signature																																			
1	28																																				
2	20																																				
3	16																																				
4																																					
5																																					
6																																					
7																																					
8																																					
Total	64																																				
First Marker	Name Dr. Ishw	Signature																																			
Second Marker																																					
<p>QUALITY</p>	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td>Reviewed By</td> <td></td> <td>Review Date</td> <td>/</td> <td>/</td> <td>/</td> <td>.</td> </tr> <tr> <td>Notes</td> <td colspan="6"></td> </tr> <tr> <td>Signature</td> <td colspan="6"></td> </tr> </table>	Reviewed By		Review Date	/	/	/	.	Notes							Signature																					
Reviewed By		Review Date	/	/	/	.																															
Notes																																					
Signature																																					

1

28
30



Q(1)
(a)



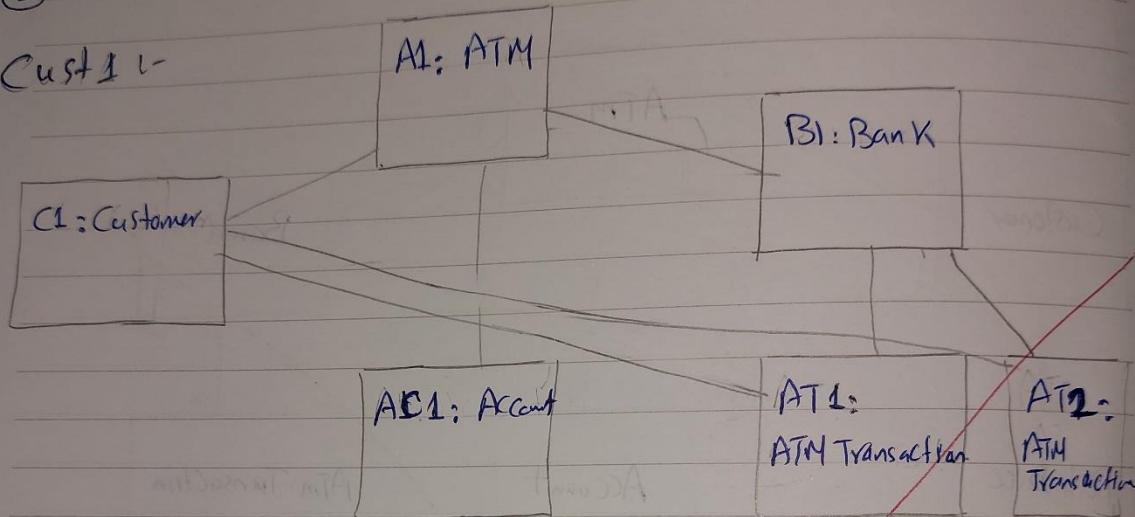
6

2

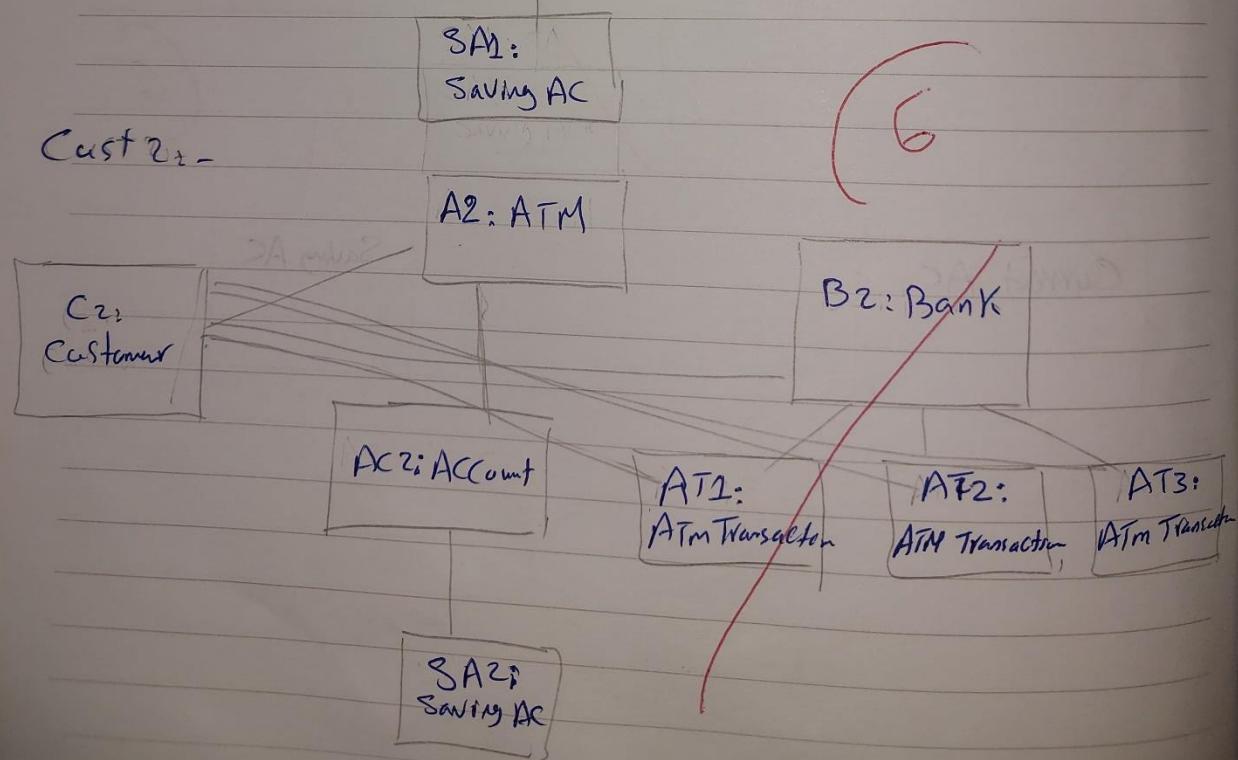


(b)

Cust 1 -



Cust 2 -



3

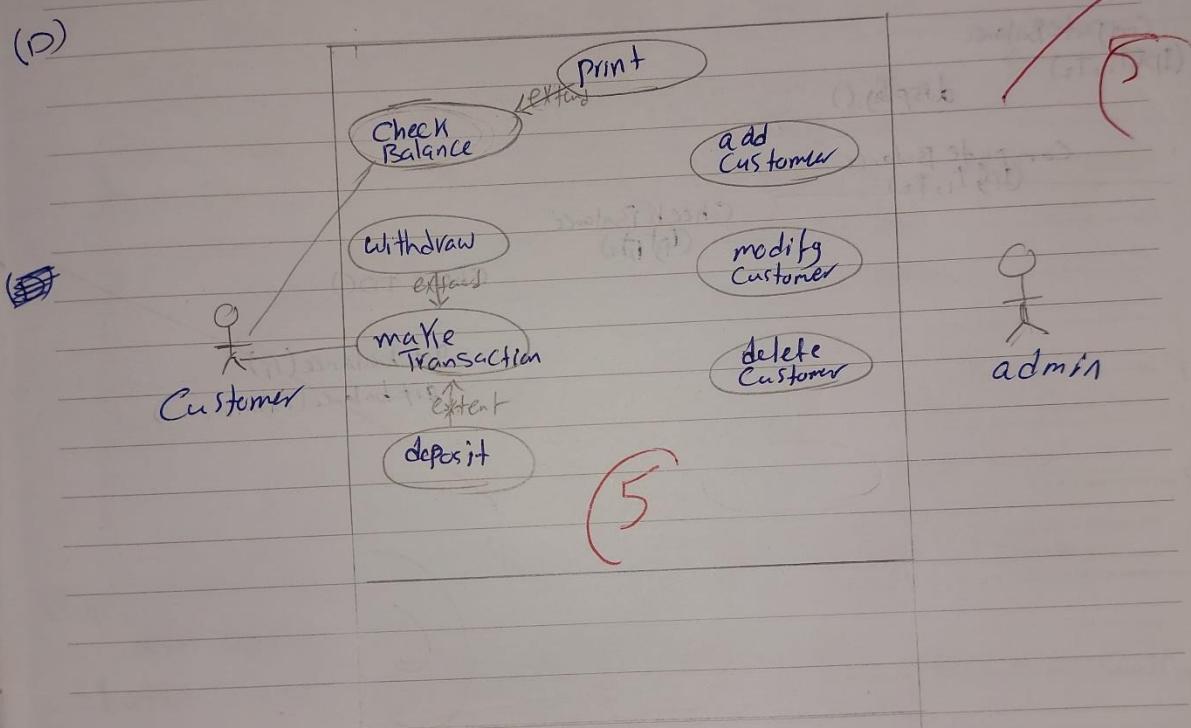


(c) Control Classes : one per use case

Boundary Classes : one per use case per Actor

~~so two classes~~ So two classes will be added for this edit.

(D)

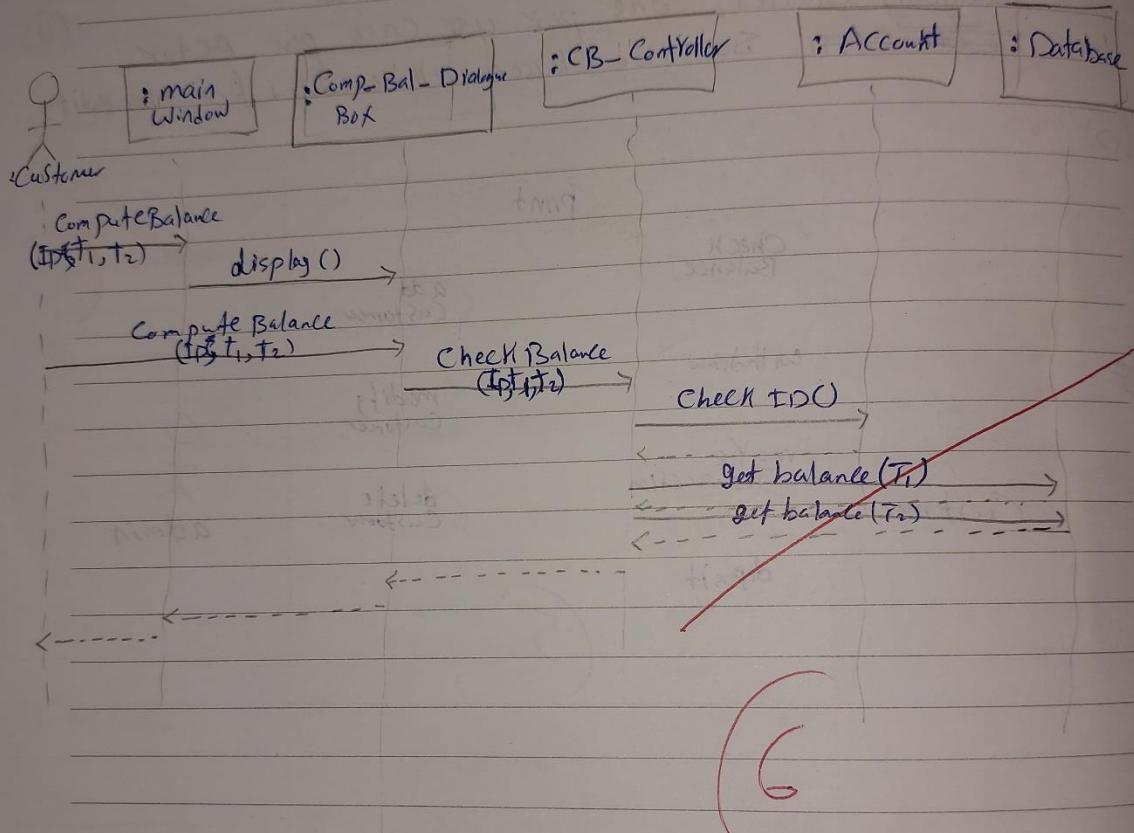


4



(e)

(Q)



26
20

5



(Q2) (a) Events: door Closed ✓ door Opened - Button Pressed - timer Timeout

(b)

Events	Current State	next state
door Opened	Ready To Cook	Door Open
door Closed	Door Open	Ready To Cook
Button Pressed	Ready To Cook	Cooking
timer Timeout	Cooking	Ready To Cook
door Opened	Ready To Cook	Door Open

(c) Event list	expected States	Actual States
button pressed	Ready To Cook - Cooking	Ready To Cook - Cooking
button pressed - door Opened	Ready To Cook - Cooking - Door Open	Ready To Cook - Cooking - Door Open

6



(d) Transition ~~is~~ Coverage method is to test every transition

that means even if you have same event but different transition

so ~~yes~~ it shall be tested.

Event	Current State	next state
button pressed	ReadyTo	
door Opened	ReadyToCook	Door Open
door Closed	Door Open	Ready ToCook
button pressed	ReadyToCook	Cooking
timer Timeout	Cooking	Ready ToCook
door Opened	Cooking	Door Open

3

$$\boxed{\frac{16}{20}}$$

7



(Q 3)

(a)

(I) - The Class model is a structural model which determines Components of the system and relation between them statically.

The object Model is Actual Application of the Class model

The Class model rules ~~the~~ or governs the object model.

(1)

3

1) iterative - re do the ~~steps~~ every cycle - (extreme programming)
model development

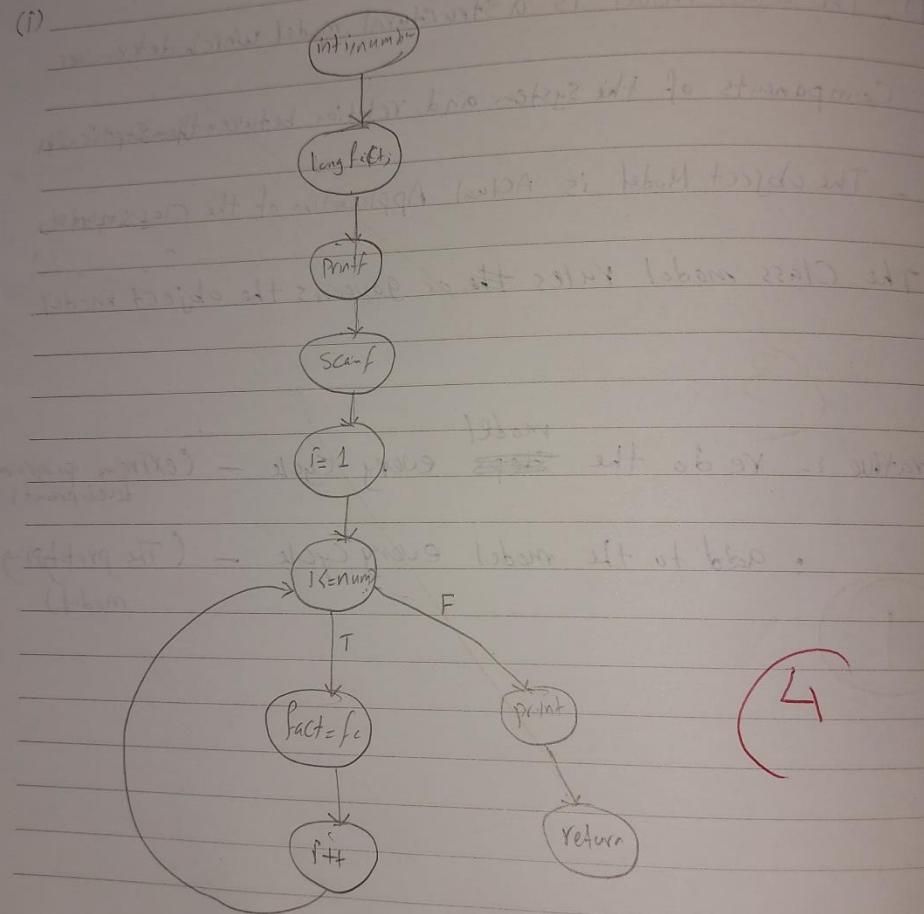
~~: add to the model every cycle - (The prototyping model)~~

1

8

(b)

(i)



(ii)

ma)

#

4

(ii)

$$n = 10 \rightarrow e = 10$$

n

$$CC = n - n + 2 = 10 - 10 + 2 = 2$$

4

2

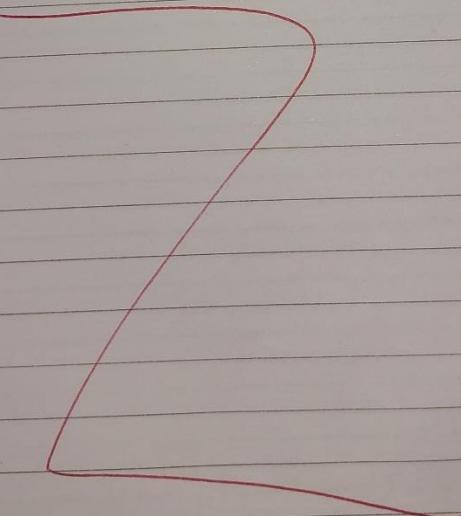
9



(iii) $(5, 120)$ could be used to test it as it will make the condition true until $i \leq 5$ then next iteration the condition will be false.

~~use 2 different cases for~~ Branch true $\rightarrow (5, 120)$
~~use 2 different cases for~~ Branch false $\rightarrow (0, 0)$

4





**AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING**

STUDENT EXAMINATION OFFICE

**ASU Engineering
Electrical
26 JUN 2021
EPM-ECE-CSE**

EXAM. NO. 1.1.10.11

BN	CSE608	Hall
34		Exam Zone 30
1 9 8 1 1 2 2 9		
PLEASE MAKE SURE THAT THE SHOWN NUMBER IS THE SAME IN THE SIGNATURE SHEET		
Proctor's Signature		

INSTRUCTOR

Program Name	Hosam abdullah meKhamer	
Course Code	CSE608	Course Name Advanced Software Engineering

Question Number	Mark	Signature
1	24	
2	12	
3	14	
4		
5		
6		
7		
8		
Total	50	

Total Mark

50

70

QUALITY

Reviewed By								
Notes								
Signature								
Review Date	/	/	/	/	/	.	.	

T4
20

1

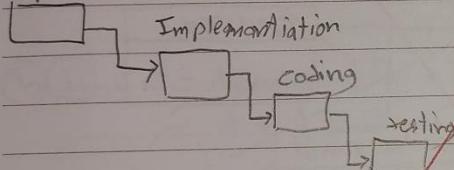


Question 3

- ② ii) The prototyping model Example: Waterfall model
- ↳ The prototyping model can't change, reuse and build up again
 - ↳ The extreme programming Development models Example: V-model
 - ↳ The extreme model can change and build up again
 - ↳ and allows more features for user, developer and stakeholders

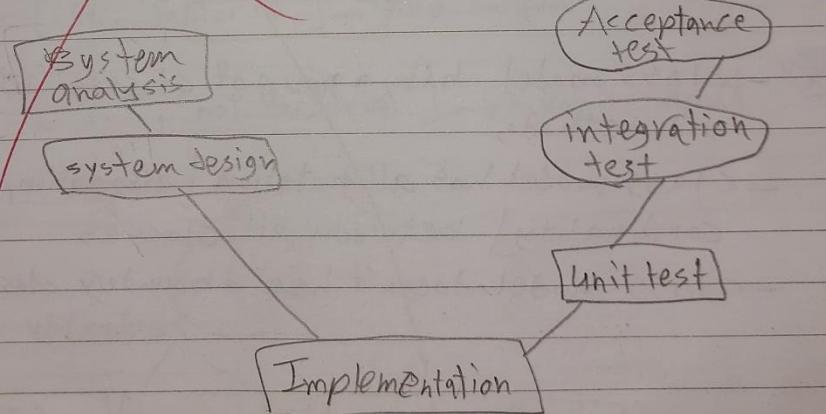
- Waterfall model

Requirements



3

- V Model

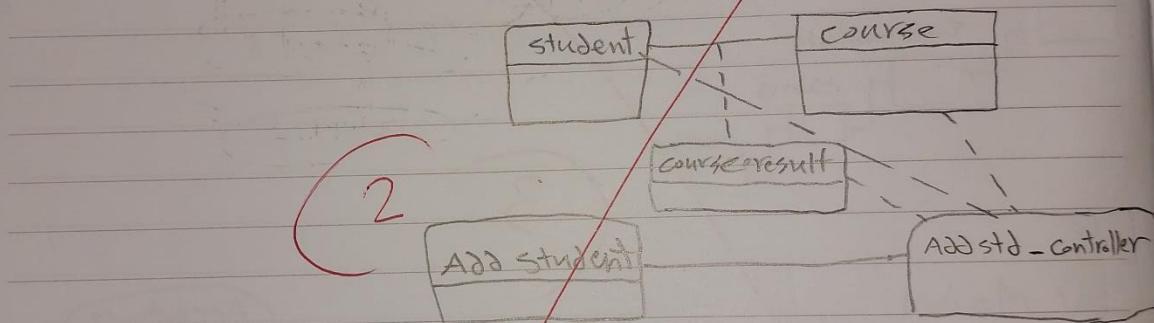


2

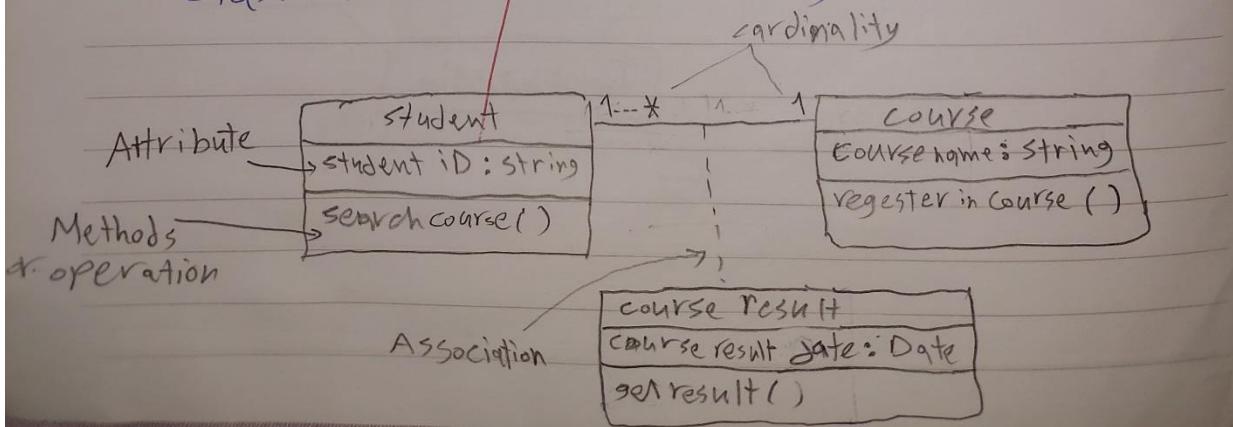


Question 3 @

- (a) i - The object model has a group of classes without attributes methods and any features
- The object diagram has a boundary class and control class called [GUI]
 - The object diagram has associations between classes but doesn't have an inheritance notation



- (b) - class model has a group of classes with attributes and methods
- class model has all notation [association, aggregation, inheritance cardinality] between all classes
 - class model doesn't have a boundary class and control class

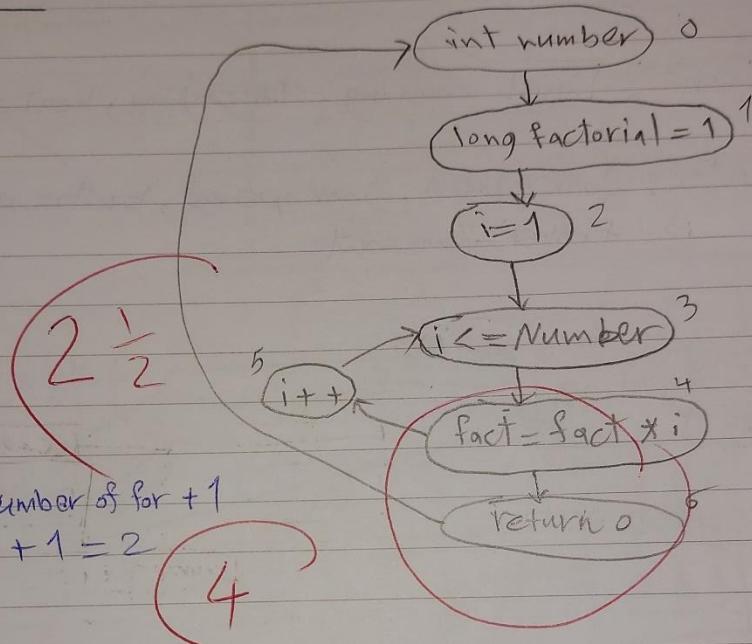


3



Question 3 (b)

(b) i)



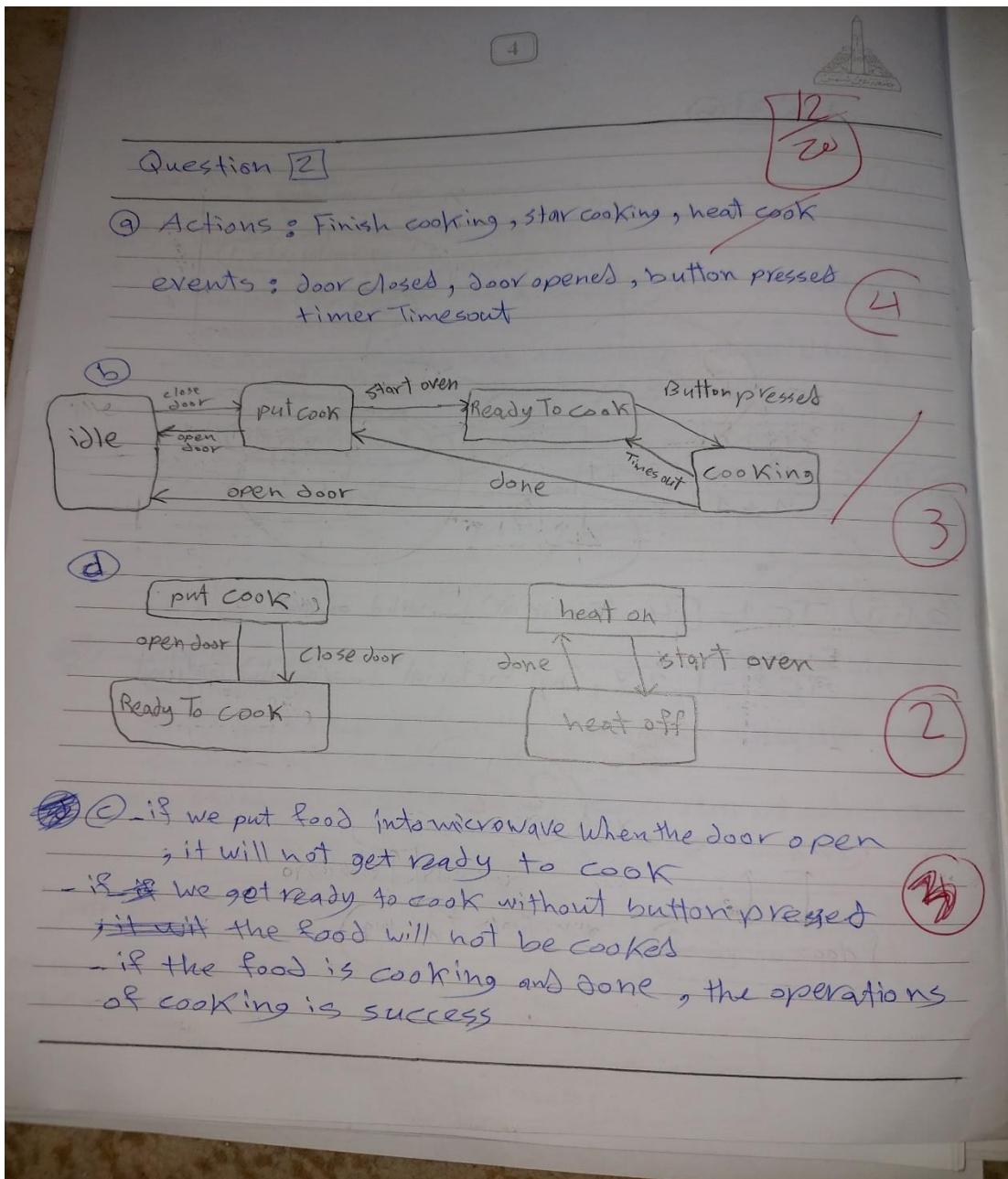
(b) ii) CC = Number of for + 1
 $= 1 + 1 = 2$

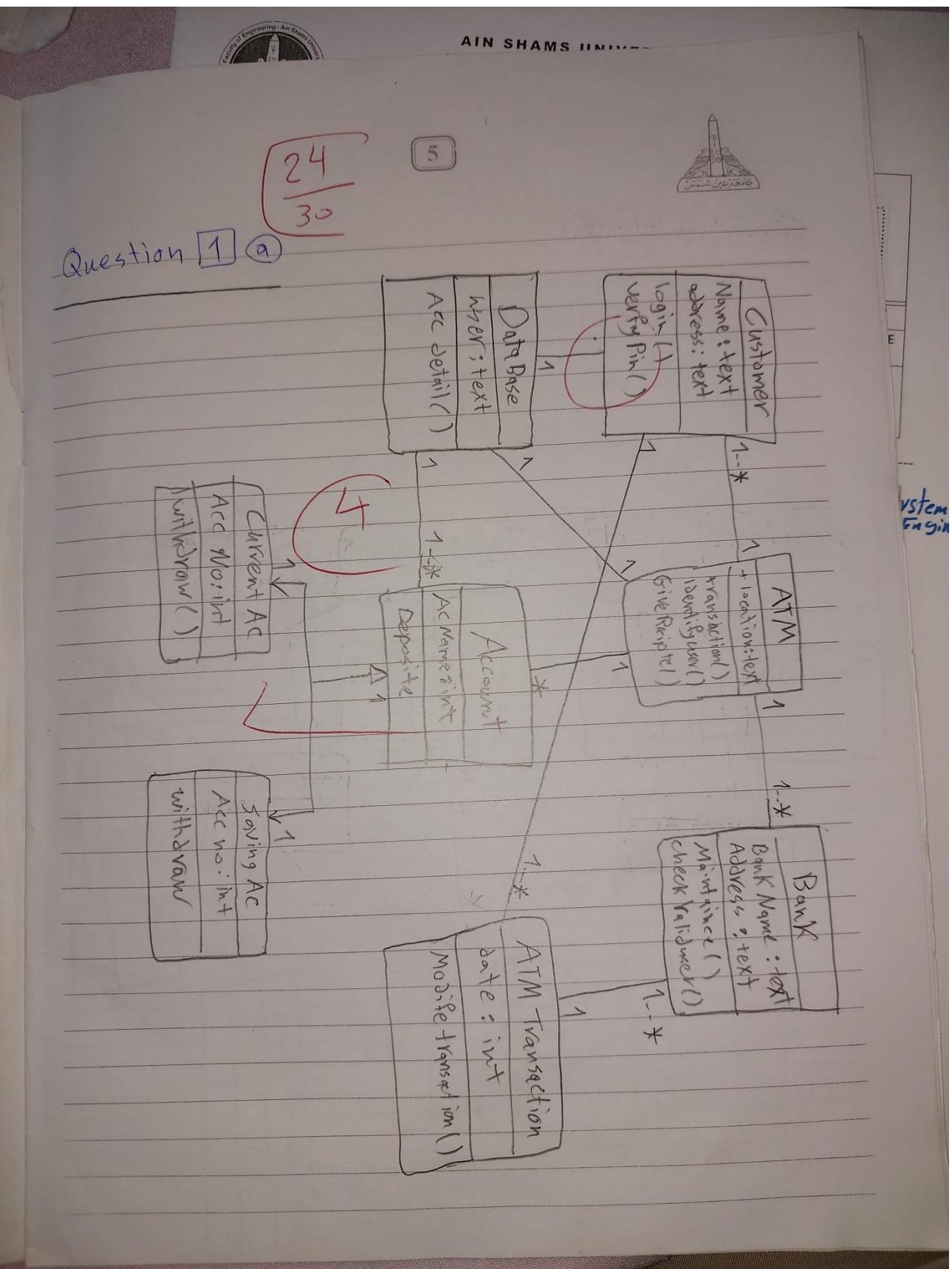
4

(b) iii) TC 1 = [4, 'factorial'] \rightarrow valid output

TC 2 = [2.7, 'not factorial'] \rightarrow invalid output

~~2½~~

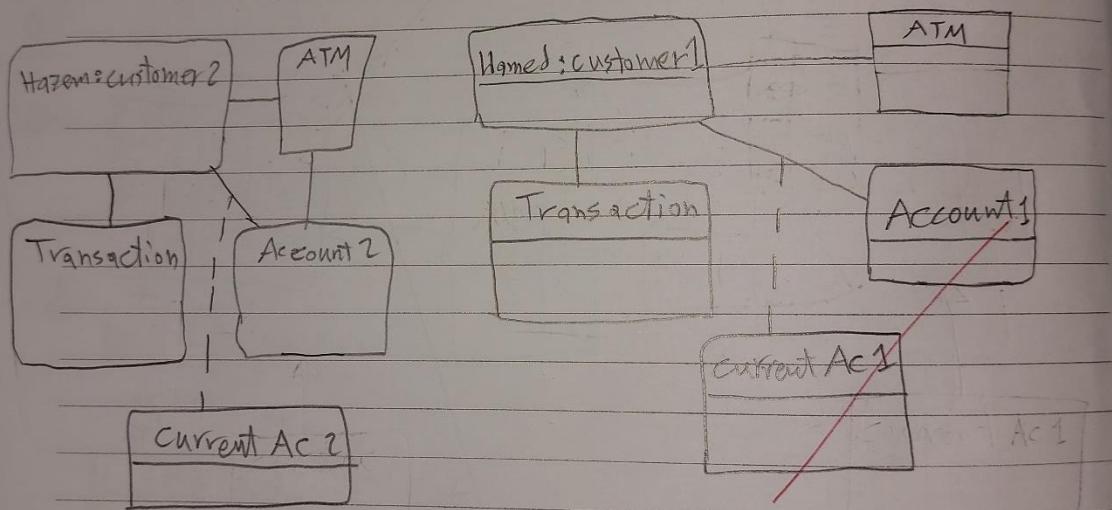




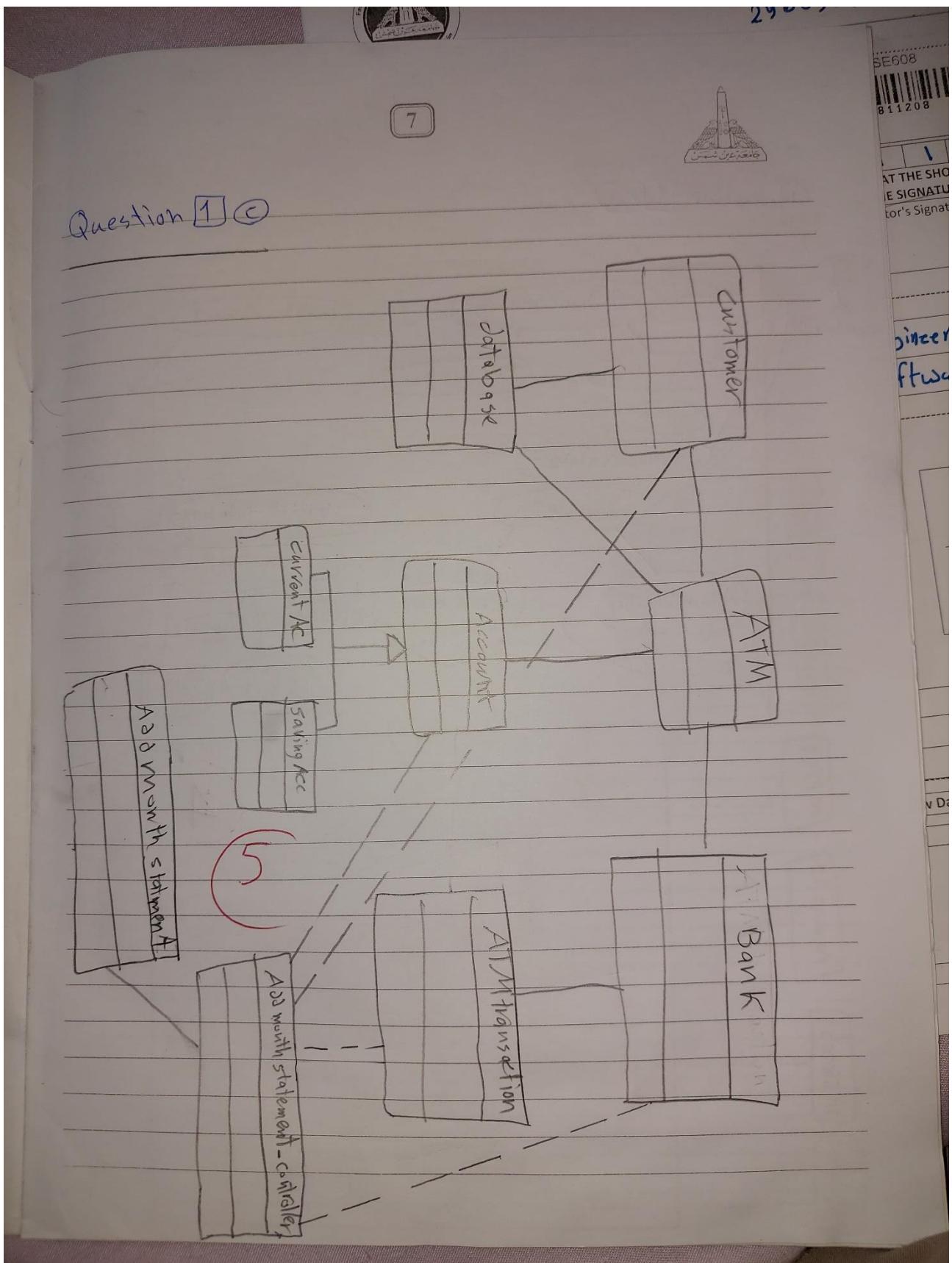
6



Question 1 (b)

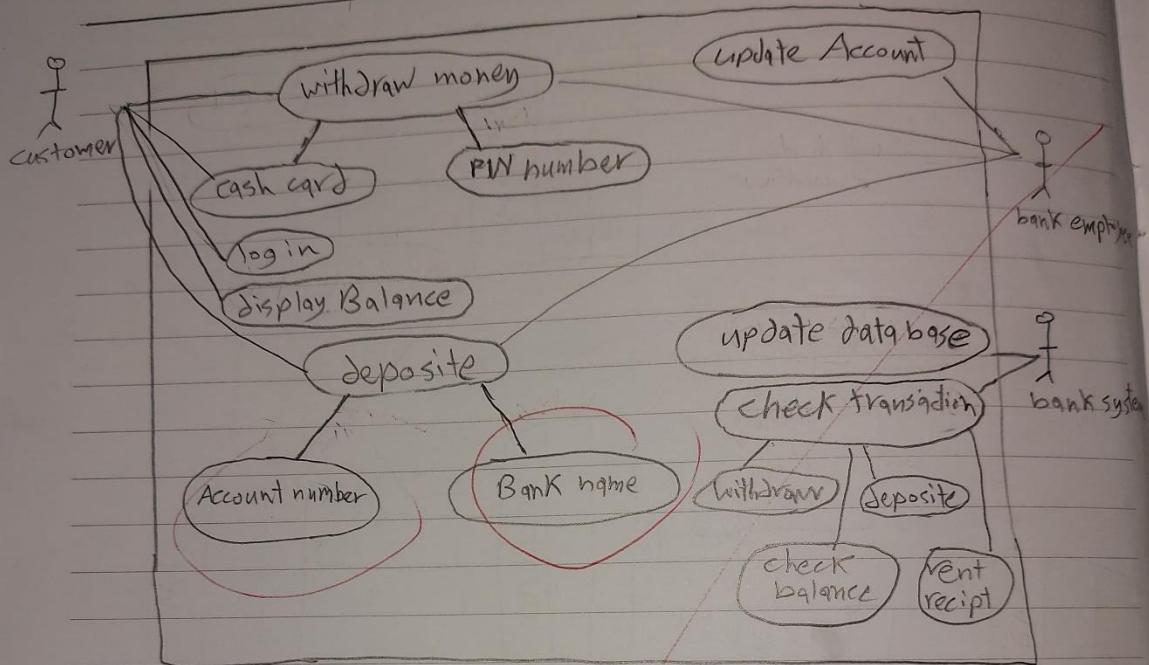


5

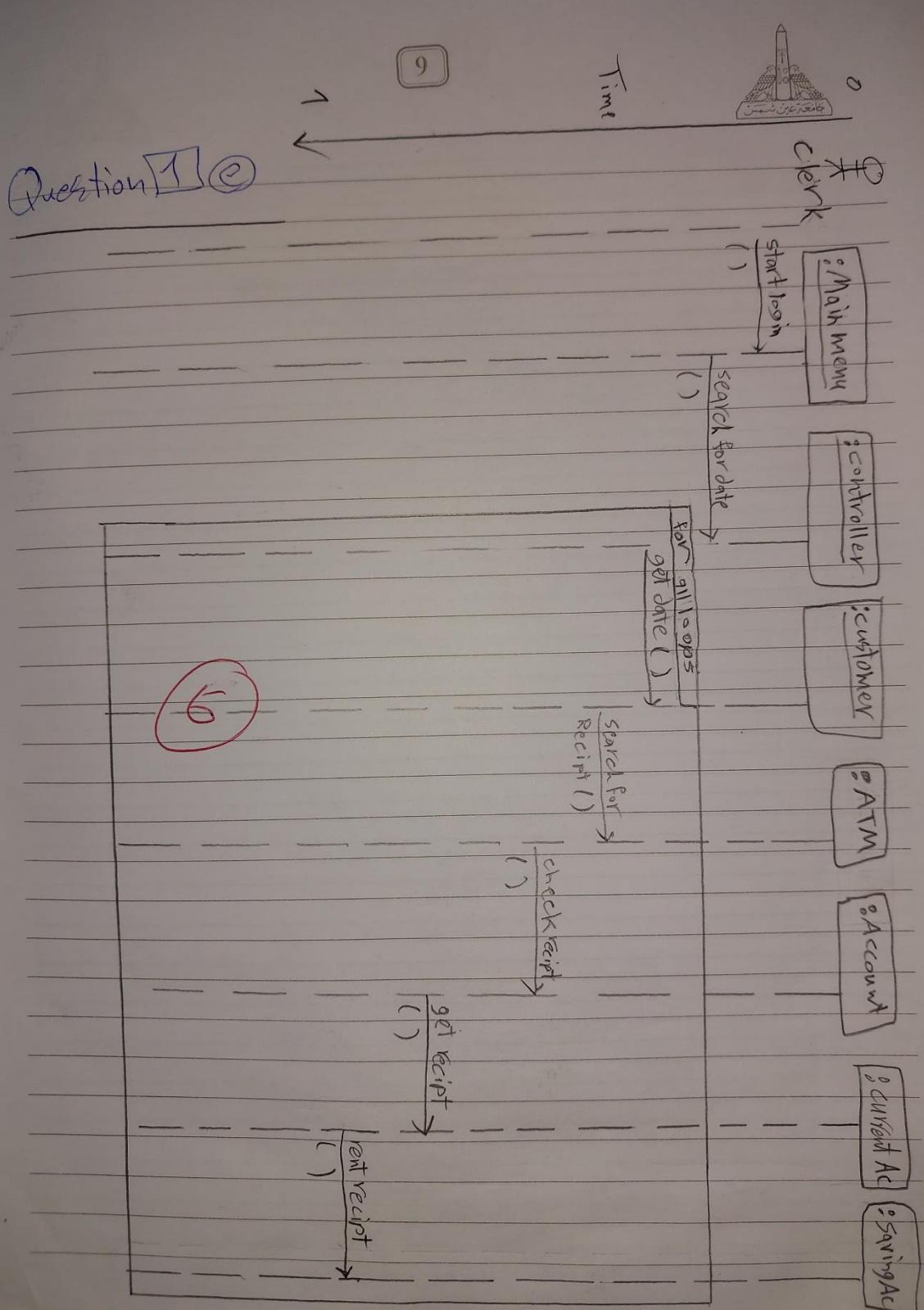




Question 1 ②



(24)





AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING

29609012100411

STUDENT EXAMINATION OFFICE

ASU Engineering
Electrical
26 JUN 2021
EPM-ECE-CSE

BN	CSE608	Hall
9	Exam Zone 30	
19811208		
1 9 8 1 1 2 0 8		
PLEASE MAKE SURE THAT THE SHOWN NUMBER IS THE SAME IN THE SIGNATURE SHEET		
Proctor's Signature		

INSTRUCTOR

Program Name **Master of science - Electrical Engineering Computer & Systems Engineering**
Course Code **CSE 608** Course Name **Advanced software Engineering**

Question Number	Mark	Signature
1	17	X
2	7	
3	13	
4		
5		
6		
7		
8		
Total	37	X

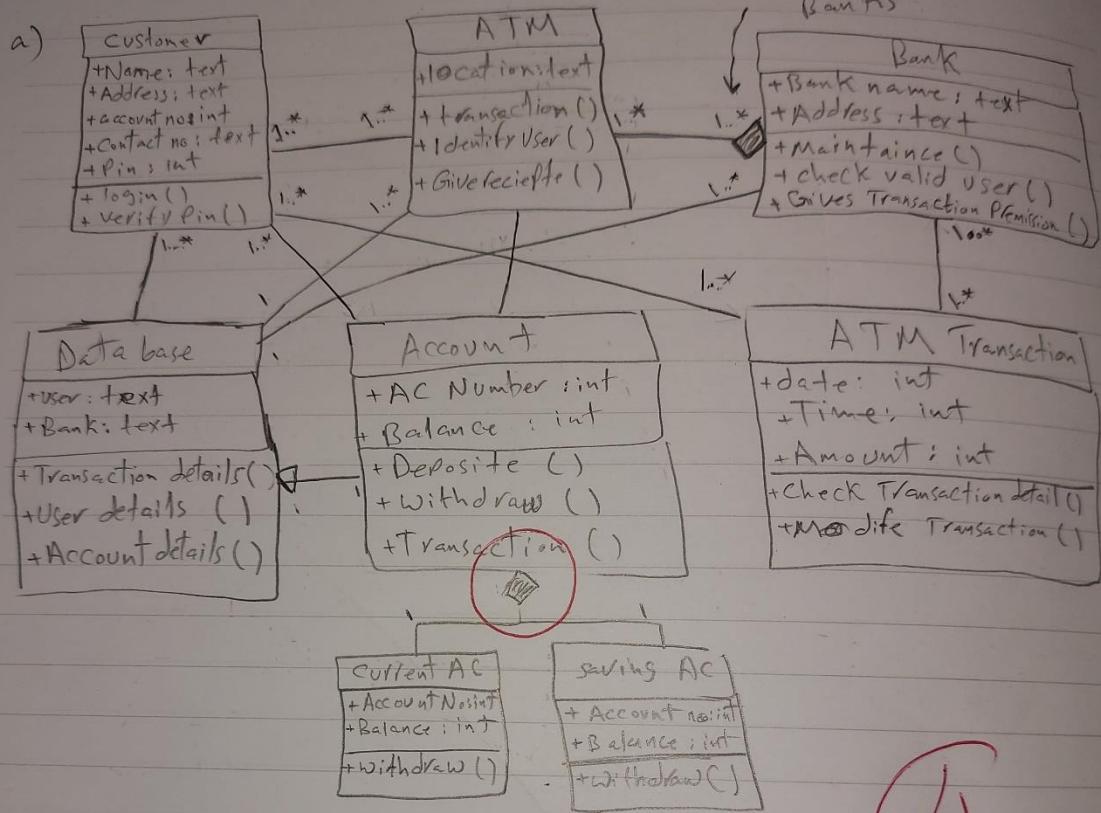
Total Mark
37
70

	Name	Signature
First Marker		
Second Marker		

QUALITY

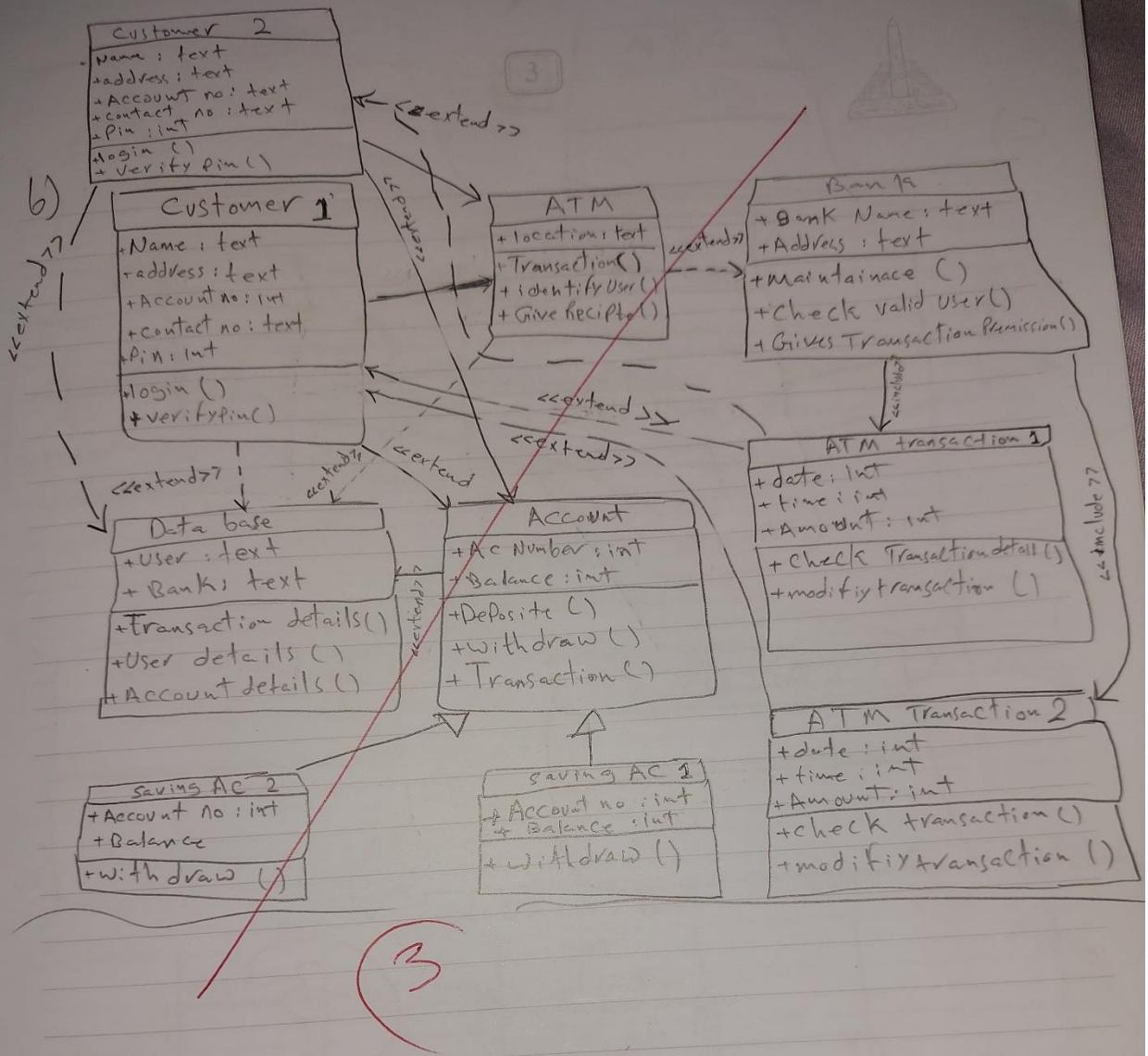
Reviewed By	
Notes	
Signature	

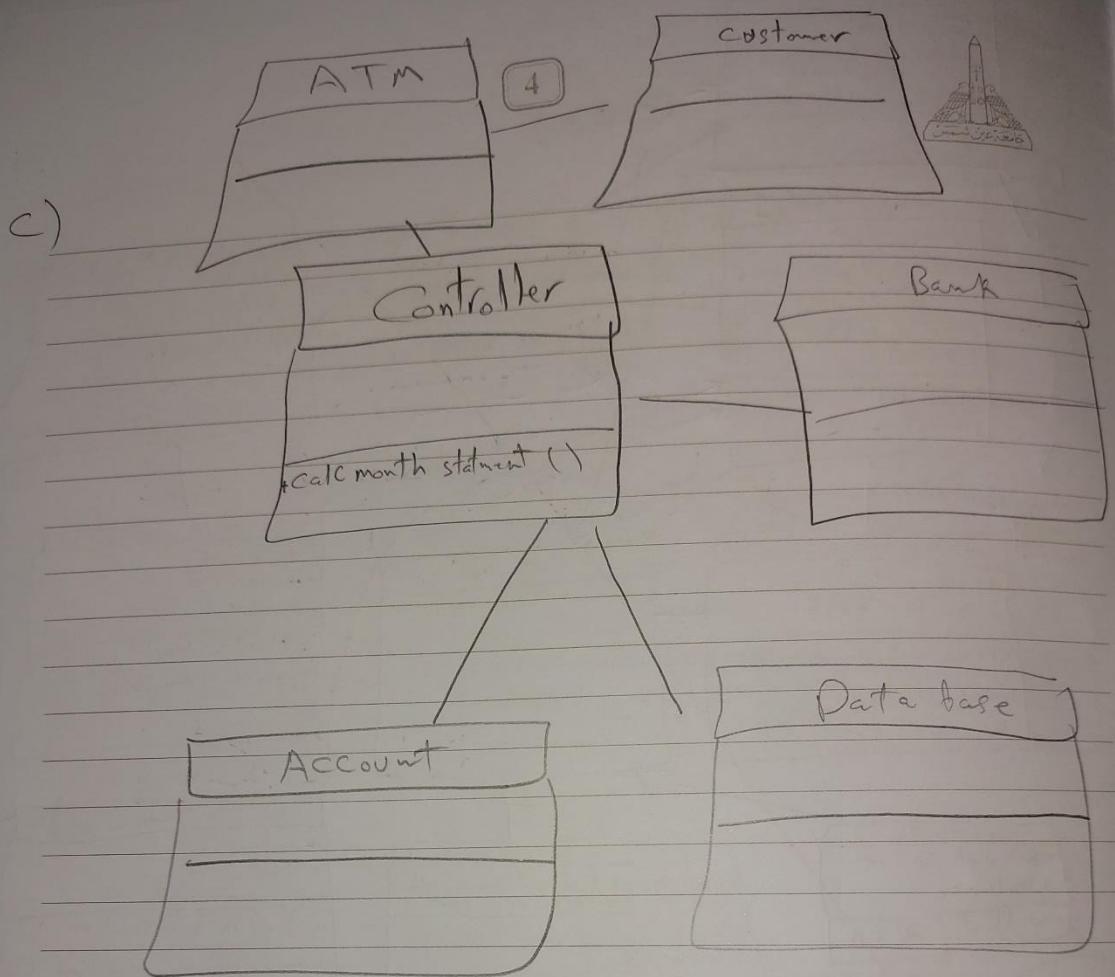
Review Date / / / .



* it might work for different Banks

17
30



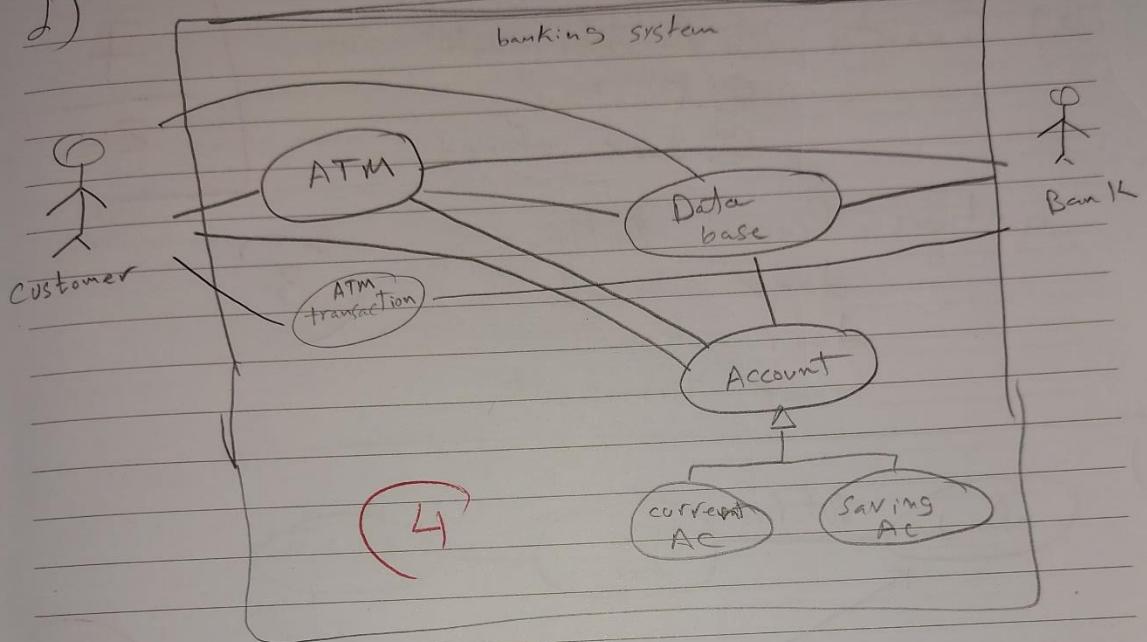


③

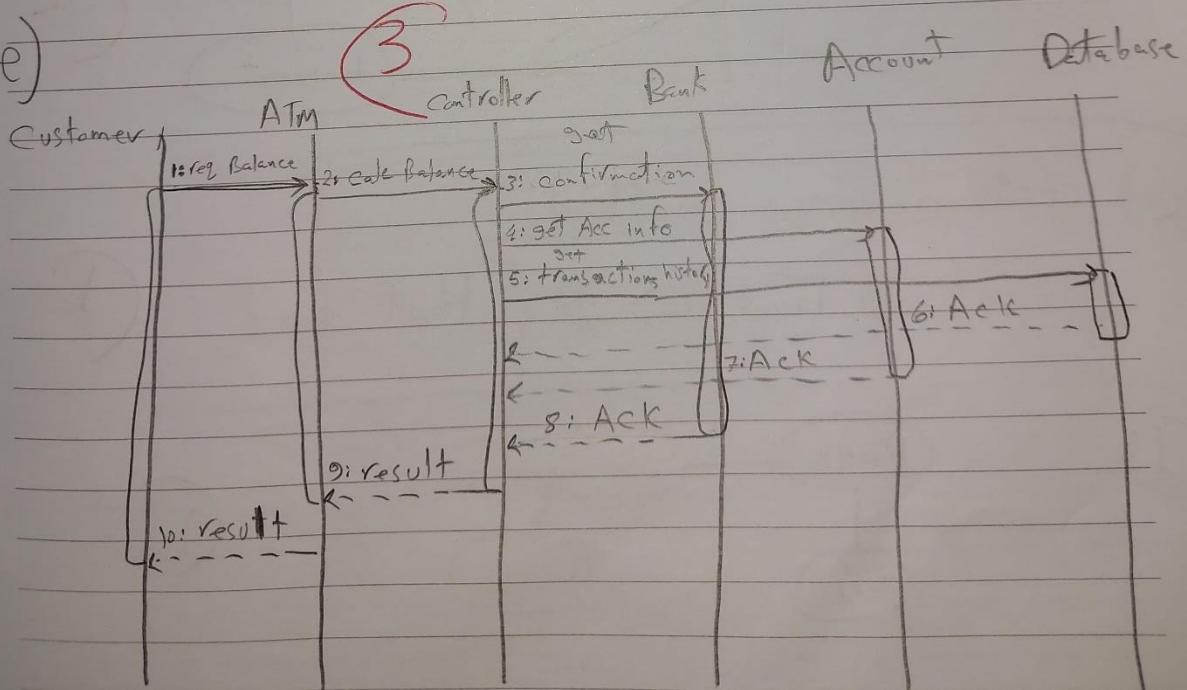
5



d)



e)



6



(2)

- a) Events : ① Ready to cook
 ② Cooking
 ③ door opened

$$\begin{array}{r} + \\ - \\ \hline 20 \end{array}$$

actions: Pressed button

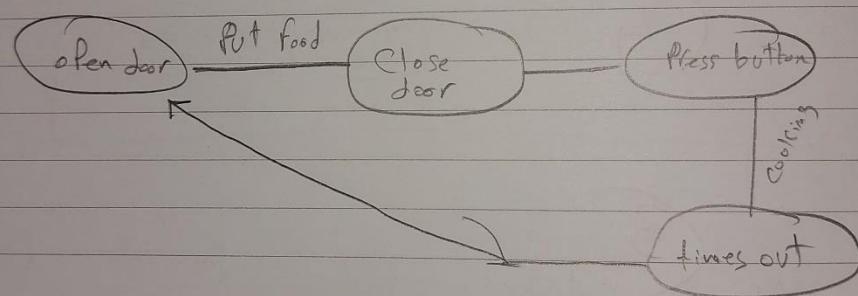
door closed

Door opened

timer times out

(3)

b)



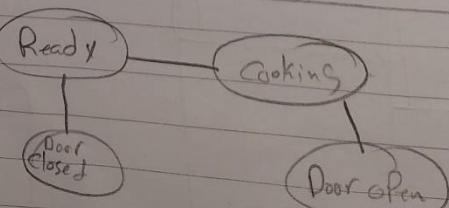
(2)

c) state coverage method

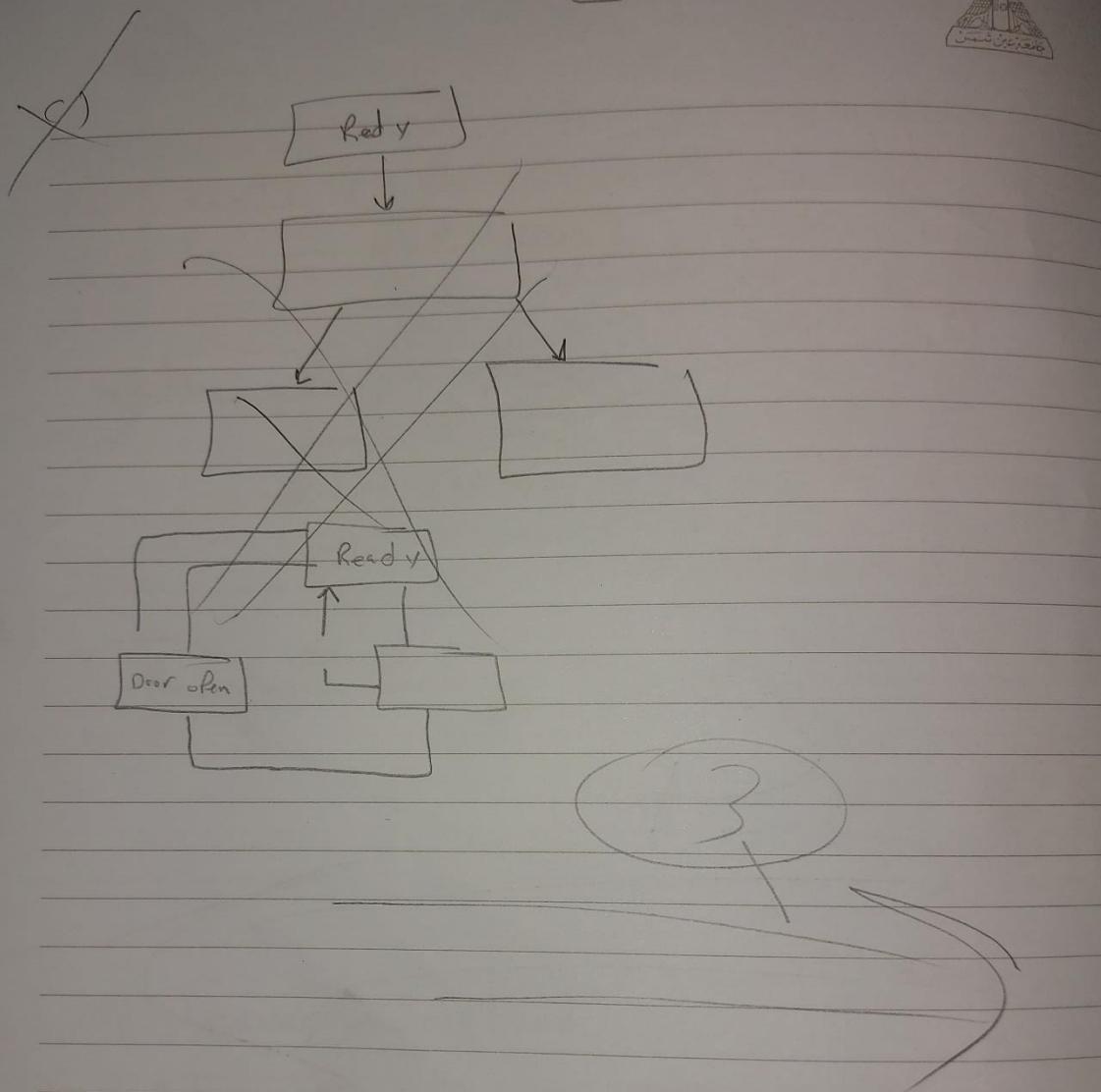
input \rightarrow Food \Rightarrow op: Hot food

(1)

(1)



(1)



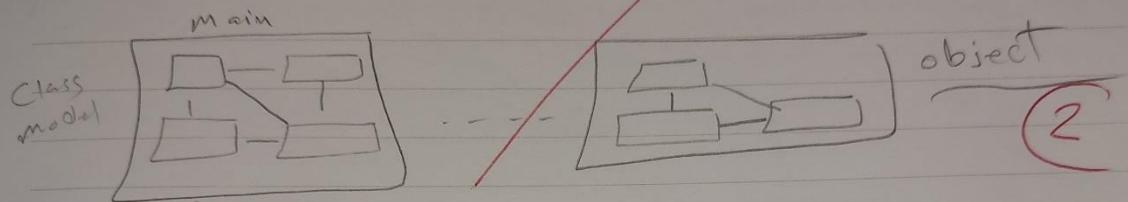
3,

9

$$\frac{13}{2^0}$$



a) i) object is specialized from class model
as we did in Q1, it's a case from the system

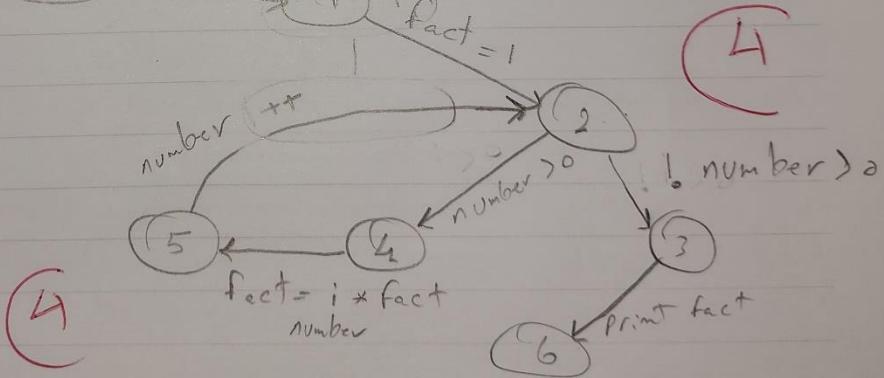


ii) Prototyping is a system development method in which the prototype is built and tested until delivered and acceptance.

Extreme programming intended to improve software quality and responsive to customer changing requirements.

b) i)

0 number = int;



ii) CC =
$$5 - n + 2 = 2$$

 $\checkmark \quad \checkmark$
 $\neq \quad \neq$

iii) TC (number < 0, Print fact)

TC (number > 0, number++) → go to (2)
and repeat