	King Saud University **College of Computer and Information Sciences** **Computer Science Department**
CSC343: Systems Analysis & Design	**Second Semester 2020 - 2021**
Take-Home Final Exam	**Wednesday, April 28th 2021**
Duration: 2.5 hours	

Important instructions (Please read carefully)

1. The exam is open-book, open-notes; Online references and other electronic or external aids are *not* permitted.

2. You must work independently, and you should not share reference materials or cooperate with other students. Assistance/collaboration is strictly prohibited and will lead to a grade **zero** on this exam.

3. The exam consists of **TWO** questions.

4. Write your answers on an external paper (electronically/by handwriting). Don't forget to write your **full name** & **ID** & **Section number** on the first page of your document.

5. Read each problem carefully. If something appears ambiguous, please write your assumptions.
6. You have exactly (**2.5**) hours to complete the exam (it's due at **4:00 pm**).

7. When you finish: scan ALL of your solution papers, save it as a single ***(.pdf)*** document, and make sure it's clear/readable.

8. When you're ready to submit: Upload your solutions document on ***LMS (Final Exam Submission)***, and make sure you submit it successfully. If you encounter any technical problem: please send it to my email: nalballa@ksu.edu.sa

Question1: BabySitter application

In the BabySitter application**,** parents can find professional sitters for their children.

Parents can check the list of the registered sitters, which shows the sitters' names, their profile pictures, and the ratings. Parents can then select a sitter and check her profile.

The profile page includes information about the sitter, her experiences, her rate per hour, and the reviews from her previous sessions. The page also shows the calendar and when the sitter is available.

Parents can request to book an appointment with the sitter, rate them after the meeting, and add them to the favorite if they want.

A) ***[6.75pts]*** **Draw the sequence diagram for the "Book a sitter" use case, based on the following scenario:**

1- The parent request to schedule an appointment with a sitter by selecting the date/time from the available time slots. They need to specify the number of children, their ages, and for how long they need the sitter.

2- The request will be sent to the setter
3- When accepted, the parent will be asked to send the location and confirm the payment information. The payment information will be verified, and the sitter's profile will be updated; this time slot will be reserved and no longer available for other parents.

4- A reminder will be sent to the parent 24 hours before the appointment. The payment will be issued, and the appointment can no longer be canceled at this stage.

5- Up to the appointment time and the sitter's arrival, the parents and the sitter can chat through the application.

6- The sitter should confirm her arrival.

7- During the sitting time, the parent can voice call or video call the sitter at any time. All calls (voice and video) will be transferred to the sitter immediately through the application.

On the other hand, the sitters can immediately voice call the parents but have to request to video call the parents and wait for their acceptance.

8- When the sitting is done, the parent will be asked to rate and review the sitter and specify the tip amount. The sitter profile will be updated with the new review, and the tip will be added to the sitter's account.

9- The sitter will also be asked to rate the parent. The application will send the rating to the administrator first, who will update the parent's profile.

Alternatives:

6.1 if the sitter arrived after more than 30 minutes of the scheduled appointment, a full refund will be issued to the parent.

Notes:

1- Show the type of messages
2- You can assume the success scenario for the parts that have no specified alternatives.

B) *[3.25pts]* Draw the State diagram to model the behavior of the system when the babysitter request to call the parent during the baby-sitting session, based on the following description:

1- the sitter can request to contact the parent; they can then choose to voice call or video call her/him.

2- the voice call will be transferred immediately to the parent.

3- the video call will need to be requested first. Accepted requests will be transferred to the parent; rejected requests will be completed as voice calls, unanswered requests will be repeated in 5 minutes.

4- if a transferred call (voice or video) was not answered, a message will be sent to the parent, and the call will be transferred again in 10 minutes.

5- Answered calls will be recorded.

6- Parents can change the call type to be video or voice at any time during the call.

7- upon the call completion, the parent can choose to save the recorded call to her/his account or to discard it.

8- the process is completed.

C) *[2pts]* Write two user requirements and their system requirements for the babysitter application.

Question2:

A) ***[4pt]*** Draw the control flow graph (CFG) for the following code segment

```
1 public double calculateTotalCost(int amount, boolean nextday){
 2
 3 double fee = 0;
 4
 5 if (nextday)
 6       {
 7         fee = 18;
 8       }
 9
10 double tax = amount * 0.15;
11
12 if (amount >= 1000)
13       {
14         charge = amount * 0.09 + fee;
15       }
16 else if (amount >= 500)
17       {
18          charge = amount * 0.07 + fee;
19       }
20 else if (amount >= 200)
21       {
22          charge = 15 + fee;
23       }
24 else if (amount >= 100)
25       {
26          charge = 12 + fee;
27       }
28 else if (amount >= 50)
29       {
30          charge = 10 + fee;
31       }
32 else
33       {
34         charge = 6 + fee;
35       }
36
37 total = amount + tax + charge;
38
39 return total;
40
41 } //end
```

B) ***[1pt]*** Calculate the cyclomatic complexity of the CFG

C) ***[3pt]*** Based on the path testing technique; find the generated independent paths from this CFG.