CS521 - Midterm Exam

St. Name: _____, _____
         Last Name,   **First Name**

Important Notes:

- Type your answers (NO hand-writing) below every question, and please make sure you distribute your time wisely to cover all questions.

- Use Visio or draw.io for all required diagrams

- The exam is individual work NOT team-work. Please do NOT communicate the exam content in any shape or form to anyone

Q1. (40 points).   (Provide short answers for the following question; a paragraph 5 to 10 lines)

1. Explain the relationship between UML activity diagram and UML system sequence diagram.

2. The intelligent object-oriented design has to be reusable, flexible, and extensible. Explain.

3. Software is composed of structure and behavior, list and explain the UML notations discussed in the class to capture these two aspects.

4. The UML Use-Case diagram documents the behavioral requirements of the software product, can these behavioral requirements capture non-functional requirements? Explain

Q2. (60 points) Consider the following high-level description for the startup company, **Nimble Commuting**, that offers different commuting services within the city of Chicago.

Deliverables:
1. Create the Actor Dictionary
2. Create the Domain Dictionary
3. Create the UML Use-Case Diagram
4. Create the UML Analysis class Diagram
5. Create the UML System Sequence diagram to enroll in the Ultimate Train plan.
6. Create the UML Activity diagram to generate a report for Train Plans usage (Number of purchases/subscriptions for every Train Plan category) per Zip Code

High-Level Requirements:

Consider the following high-level description for the Nimble Commuting provider that provides services to residence within the city of Chicago area:
- The intent is to build an application that will allow the customer to enroll in a plan or order/purchase any of the services listed below:
    1. Bus plan
        1. Basic - 60 passes/rides for $100/month
        2. Flex – 120 passes/rides for $150/month
        3. Ultimate - unlimited passes/rides for $250/month
    2. Train plan
        1. Basic - 60 passes/rides for $75/month
        2. Flex – 120 passes/rides for $100/month
        3. Ultimate - unlimited passes/rides for $150/month

3. Bike plan
    1. Basic - 60 passes/rides for $20/month
    2. Flex – 120 passes/rides for $30/month
    3. Ultimate - unlimited passes/rides for $50/month

4. Convenience Plan
    1. Basic - 60 passes/rides (For any ride/pass using Bike, Bus, Train) for $60/month
    2. Ultimate - unlimited passes/rides for $300/month

5. Daily Plan
    1. Bike $1 for 2 hours usage
    2. Bus $3 ride/pass
    3. Train $2 ride/pass

- Nimble Commuting offers the following Free rides/passes:
    1. Earn a free Bike ride/pass for every 10 rides in the month of June.
    2. Earn a free Bus ride/pass for every 20 rides in the month of December

- Nimble Commuting has different roles/logins/webpages :
    1. Managers
    2. Account Specialists (Customer Support)
    3. Customers
    4. Sales Team

- A manager can
    1. Add/delete routes for bus/train
    2. cancel/update/delete any type of order
    3. Add/delete commuting plans

- Account Specialist can
    1. Create an account for a new customer
    2. Update customer account
    3. Create an incident ticket

- Sales team can
    1. Use the customer transactions data to forecast sales revenue.
    2. Forecast demand for Bikes, Trains, or Buses
    3. Analyze demand across the different zip codes for its customers.

- Customer that has an existing account can do the following online:
  1. Update Record (credit card, personal info, etc.)
  2. Pay Monthly Bill
  3. Change/Cancel/Add personal commuting plan
  4. Review/Rate a purchased plan
  5. Review/Rate a ride
  6. Can subscribe/unsubscribe to receive email notifications for a free Train pass on July 4th; currently Nimble Commuting gives 500 free train passes for randomly selected customers on July 4th.