3CS3560 Practice Midterm

The real midterm is worth 100 points, 30% of your grade. It must be your own work, do not use the internet or help from other people. You may have one page of notes. Treat this practice midterm as if it was your real midterm. Study to prepare, then take this test. When you are done, evaluate how you did. Now look through your notes, and refine your answers. Come to class prepared to discuss and learn!

Question 1. What are the big ideas in object oriented programming?

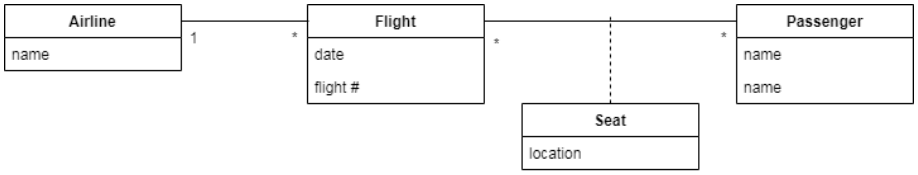
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Question 2. Design a *class diagram* for the following problem statement. Include the relationships between the classes, and the appropriate multiplicity. Include any attributes or methods that are mentioned in the following description, but do not add any attributes or methods that are *not* mentioned.

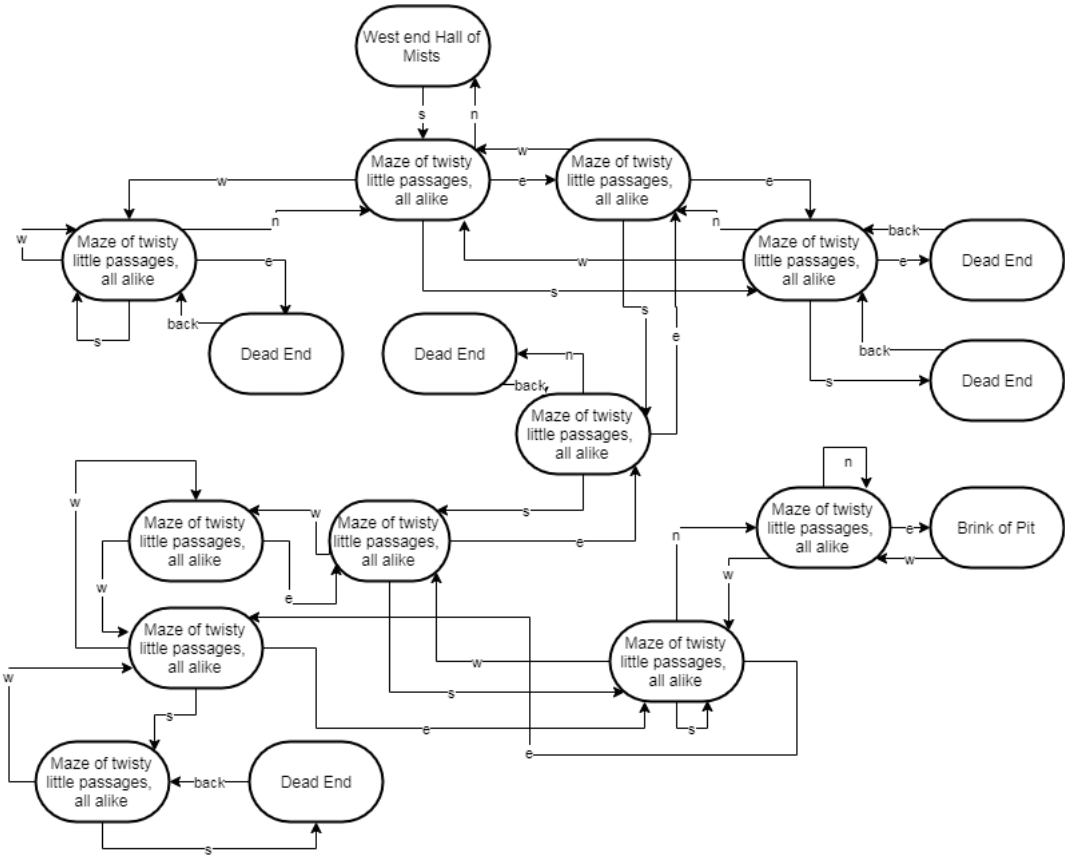
> *A simple diagram editor is used to design a diagram on a sheet. A sheet is a collection of links and boxes. A box has a size, position on the page, color, and may optionally contain some text. A link is a sequence of line segments that connects two boxes. Each line segment is either horizontal or vertical, and connects two points. A point may be shared by a vertical and horizontal segment in the same link. A buffer is a collection of links and boxes that have been cut or copied from the sheet. Note that a link or a box belongs to one buffer or to one sheet. The user can add, move, or delete links or boxes. Elements can be cut, copied, or pasted to the buffer, and the sheet can be read from a file, written to a file, or printed.*

Question 3. Given the following class diagram, provide an object diagram for the following scenario:

Flight B1234 of American Airlines is scheduled on 3/15/20. Three of the passengers on that flight have reserved the following seats: Tom, for seat 12C, John for seat 11B, and Janet for seat 10A. American Airlines has also scheduled flight B1548 on 3/17/20. Both Tom and John have reserved seats 23A and 17B, respectively, for this return flight.



Question 4. The *Adventure* game, or the *Colossal Cave Adventure*, was the first interactive fiction game, and was a trend-setting computer game. In this game the computer would print a description of the room you were in, then you could type a short English command or phrase, directing the computer how to proceed. At one point in the game you entered the *twisty little maze*, where every room had exactly the same description, so it was really difficult to map out this part of the dungeon. However, if you dropped some of the items you were carrying into different rooms, you could then figure out the map. The following state diagram shows an approximation of this maze. The question? If you start in the *west end of the Hall of Mists*, what is the shortest sequence of moves to get to the *Brink of Pit*?



Important bonus question: Note: If you were in a room that had no passage to the north, and you asked the computer to move it that direction, it would reply, "you can't go that way". Not only would you be left in the same room, but you would also have a clue what room you are in! So here is a bonus question: If your friend had been playing this game, and was in one of the rooms labeled "Maze of twisty little passages, all alike", but then left, and you came upon the game. what is a sequence of commands that you could enter that would bring you to the *West End of the Hall of Mists*. Your instructions can have branches, so you could say, for instance:

> step 1: Go North. If the program responds "you can't go that way", then go to step 20. If you are still in the maze, go to step 2. If you are at a dead end, go to step 8. If you are in the "Hall of Mists", we are done.

If you write this neat enough for me to understand, and if I randomly pick a starting point, follow your algorithm, and get to the Hall of Mists, **you get a 10-point extra credit on the real midterm.**

Question 5. Prepare an activity diagram for computing a restaurant bill. There should be a charge for each item delivered. The total should be subject to tax. A service charge of 18% is applied for groups of six or more, but for smaller groups there should be a blank entry for a gratuity. Any coupons or gift certificates should be subtracted.