

NAME :

The exam is closed book, no notes and no computer.

All your answers to the questions below must be submitted on paper.

Write your name on this sheet and submit it with your answers.

Please do not ask questions during the exam.

1. A company has a sales and a customer service department. Both departments bill the customers for sold goods and rendered services. In setting up the software for the billing of the customers, there are two possible ways to organize the modules.

- (a) Each department, sales and services, has its own billing module.
- (b) There is only one billing module to support both the sales and the services.

Which of the two designs is best?

Justify your choice by application of the key principles of good modular design.

2. What is a polynomial time algorithm? Give an example of such an algorithm.
3. Write a function to prompt the user for a dollar amount in the format `d.dd` where `d` is a decimal representation of a natural number in the range from 0 to 9, 0 and 9 included. As long as the user fails to enter this amount, the user is asked to retry. The function returns the entered number as a float.
4. Consider the `BallotBox` class which represents the number of votes in favor or against a certain motion. There are two types of users of the `BallotBox`: `Voter` and `Clerk`. Voters vote, after identifying themselves with a login. After voting, a voter logs off. A clerk initializes the `BallotBox` and retrieves the tally of the votes, in favor or against the motion. Draw the class diagram for the `BallotBox`.
5. For an event, there are three types of passes: front, center, and upper, depending on the location of the seating area. The passes contain the name of the participant and the type of seating. To model a pass, define a class `EventPass`. An object of this class stores the name of the participant and the type of the pass. The `string` method returns the statement which contains the name of the participant and the type of the pass. Write Python code for the constructor and the `string` method.
6. A parking meter allows the user to buy parking time: 25 cents for 15 minutes, with an upper limit of one hour. Draw a GUI for a parking ticket dispenser. For each widget, write one complete sentence to explain its working.
7. Explain the difference between a thread and a process. Illustrate with an example.