注意事項：

　　1.答案卷書寫題號依序作答，不必抄題。

　　2.答案卷不可書寫任何可辨別個人姓名或特殊標記，違反者以零分計算。

　　3.請於試題紙上填寫准考證號，繳卷時「試題」、「答案卷」一併繳回。

1、 What is a deadlock, and how can it be avoided? Discuss several deadlock-avoidance strategies.

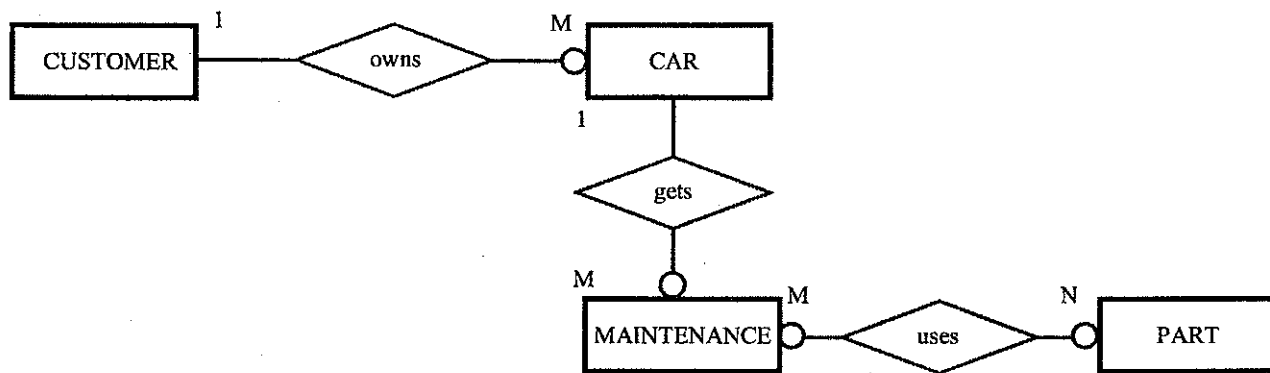2、 Suppose you are working within the framework of the conceptual model in Figure 1.

Figure 1. The Conceptual Model for Question 2

Given the conceptual model in Figure 1:

a. Write the business rules that are reflected in it.

b. Write a weak relationship that reflects in it.

c. Write a strong relationship that reflects in it.

3、 Describe the different types of database requests and transactions.

4、 What is a DBMS, and what are its functions?

5、 Answer whether correct or incorrect for each of the following statements.

　　a. $5n^4 + 3n^2 = \Theta(n^4)$

　　b. $4n^{2.01} + 3n \log n = \Theta(n^{2.01})$

　　c. $5^n + 7 = O(3^n)$

　　d. $2n^3 + 3n^2 \log n = \Theta(n^2 \log n)$

6、 It is assumed that we have the following key values in sequence: 30, 22, 18, 31, 25, 5, 10. Write out the max heap after each value is inserted into the heap.

7、 Please show that Kruskal's algorithm generates a minimum cost spanning tree.

8、 List the five layers of the TCP/IP layering model and briefly describe the functions of each layer.

9、 What is the meaning of the term *busy waiting*? What other kinds of *waiting* are there in an operating system? Can *busy waiting* be avoided altogether? Explain your answer.

10、 Assume two TCP clients start at about the same time. Both set the SO_REUSEADDR socket option and then call bind with the same local IP address and the same local port. But one client connects to 163.17.136.10 port 7000 and the second connects to 163.17.136.10 but port 8000. Describe the race condition that occurs.