Notes: There are five questions in this assignment. Each question has 10 points.

1. (10 pt.) Design and describe an application-level protocol to be used between an Automatic Teller Machine, and a bank's centralized computer. Your protocol should allow a user's card and password to be verified, the account balance (which is maintained at the centralized computer) to be queried, and an account withdrawal (i.e., when money is given to the user) to be made. Your protocol entities should be able to handle the all-too-common case in which there is not enough money in the account to cover the withdrawal. Specify your protocol by listing the messages exchanged and their formats, and the action taken by the Automatic Teller Machine or the bank's centralized computer on transmission and receipt of messages. Sketch the operation of your protocol for the case of a simple withdrawal with no errors, using a diagram to illustrate the messages exchanged. Explicitly state the assumptions made by your protocol about the underlying end-to-end transport service.

2. (10 pt.) How does SMTP mark the end of a message body? How about HTTP? Can HTTP use the same method as SMTP to mark the end of a message body? Explain your answer.

3. (10 pt) What is the Apache Web Server? How much does it cost? What functionality does it currently have? You may want to look at Wikipedia to answer these questions.

4. (10 pt.) What is the function of a DNS server? When you click on an URL, your local DNS does not have the information to complete the job of DNS server. What is the possible process that your local DNS has to do?

5. (10 pt) Comparing HTTP 1.0 with HTTP 1.1, what are the major differences between the two? Which one will perform better from a client point of view? Do you see any condition that HTTP 1.0 will perform better from a server perspective?