

Name: _____

You have 150 minutes (2.5 hours) to complete this exam. There are seven questions. Time will begin as soon as you start reading the first question.

- You may use any material, including the text book, lecture slides, and notes. You may also use anything found on the Internet that existed before the exam started.
- You may NOT communicate with any other person during this exam, either in person or using electronic means.

As strategies for completing the exam, keep the following in mind:

- If you find a question to be ambiguous, make assumptions as you see fit, but write down your assumptions.
- You are more likely to get partial credit for a wrong answer if you show your work.
- Be careful not to get carried away and run over the time limit by spending too much time on one question. Plan ahead, and don't devote more time to a question than it is worth.

Please write your answers in the space provided.

Score Summary (for use by grader)

Question	Possible points	Actual points
1	10	
2	20	
3	10	
4	15	
5	8	
6	7	
7	10	
TOTAL	80	

Question 1. By land, air, or sea? (10 points)

Let's say I have access to two separate ways for sending data across the pond to London, with the following characteristics:

- Satellite link: higher latency, higher bandwidth
- Undersea cable: lower latency, lower bandwidth

Part A. (3 points) Of the two, which would you choose for having a telephone conversation with someone in London? In a sentence, explain why.

Part B. (3 points) Of the two, which would you choose for sending a DVD's worth of information to someone in London? In a sentence, explain why.

Part C. (4 points) Let's say I put data on a hard drive and ship it to London via overnight mail. Characterize this method of transmitting information: (less than ten words for each)

Latency: _____

Bandwidth: _____

Question 2. Databases (20 points)

Develop a database for managing a gift list. You will need to keep track of people (make up some properties like "age") and information about gifts (e.g., make up some properties like "price"). Importantly, each person may want more than one gift, and the same gift may be desired by more than one person.

Part A. (12 points) Design this database. Sketch out your table structure; identify primary/foreign keys. Make up sample data to fill in a few rows. To receive full credit, the examples should demonstrate a person wanting more than one gift and a gift being desired by more than one person.

Part B. (2 points) The relationship between people and gifts is: (pick one)

one-to-one

one-to-many

many-to-many

Part C. (6 points) Pick a person. Write a database query to list the gift or gifts that he or she wants. Show the results of the query. Either an SQL statement or a query in terms of conceptual operators (join, project, restrict) is acceptable.

Question 3. Buffering and Rebuffering (10 points)

Believe it or not, I actually like to watch Congressional testimonies online at C-SPAN.org (just kidding!). Anyway, I go to the site, click on a link that pulls up RealPlayer. However, the video does not start immediately. It says “buffering” in the status window of the player. In at most a couple of sentences, tell me what the software is doing.

I’m happily watching the exciting testimony, and all of a sudden it stops. The status window of the player says “rebuffering”. In at most a couple of sentences, tell me what has happened and what the software is doing.

Question 4. Programming (15 points)

Consider the following JavaScript program:

```
var n = 4;
var i = 0;
var total = 0;
for (i=0; i<n; i++) {
    total += i * i;
}
```

Part A. (5 points) What does the program do?

Part B. (5 points) What value is stored in the variable **total** after the program completes execution?

Part C. (5 points) What is the importance of “i++” in the **for** statement? What would happen if I took it out?

Question 5. Search (8 points)

Name **two** natural language issues that make keyword-based querying difficult. In one sentence each, briefly explain what they are. For each, describe **one specific** strategy, device, technique, or method that attempts to address the difficulty (something overly broad like “conceptual search” or “natural language understanding” does not count).

Question 6: Huh? (7 points)

The perfect query paradox: In order to formulate a good query to get what you're looking for, you have to already know what it is you're looking for. However, if you already know what you're looking for, why are you searching in the first place?

In at most a few sentences, critique this "paradox".

Question 7. Policy and Privacy (10 points)

Congress is interested in protecting the privacy of Internet users and your congressional representative has asked for your opinion on that subject.

- Identify **one** threat to the privacy of Internet users.
- Identify the capabilities and limitations of **one** technical means for addressing that threat.
- Identify **one** policy option that might be used to address that threat through legislation or regulation, and then state and justify your opinion on whether the legislation or regulation is a good idea.

Please answer this question carefully. You will only receive full credit if you address **all** bullet points. You will not receive extra credit for providing more than one response when only one was asked for. I am looking for a well-crafted, succinct argument, not everything you know about privacy.