Practice Final Exam

3 May 2012 from 3:40–5:40 in the lab

You have two hours, if you need it. Write your answers on this page, or additional blank sheets. Put your name at the top of each page. You may not use books, notes, computers, or other devices. You may use a calculator. You may leave when you have completed the exam.

1. For each statement below, fill in the blank with the *best* term from the following list. Some terms might be used more than once; some might not be used at all.

   • domain name • foreign key • frequency analysis • HTML • HTTP • IP address
   • password • primary key • public key • table

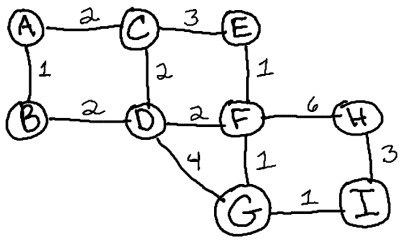
   (a) _____ is the way that web browsers and servers communicate with each other.

   (b) Cryptography based on a(n) _____ was a breakthrough because it meant we no longer need to establish a *shared secret* with our comrades.

   (c) A(n) _____ is an attribute that uniquely identifies each row in a database table.

   (d) A(n) _____ is a dotted text identifier for machines on the Internet. It is translated into a(n) _____ before routing data to the target machine.

2. The diagram below depicts a wide area network with nodes labeled A through I. The numbers on each connection are an estimate of how long it takes for a message to travel between those two machines.



   (a) If we need to send a message from A to I, what is the best route to take, and how long should it take? _____

   (b) If the node labeled F is taken offline suddenly, then what is the best route, and how long should it take? _____

   (c) Is there any *single point of failure* in this network? In other words, can taking one machine offline disconnect the network?

3. The three tables below are a representation of a database for a health clinic. The last table, 'Appointment', contains foreign keys referencing the Physician and Patient tables. Examine the tables and answer the questions below.

Physician

ID*	First	Last	Specialty
1	Joe	Chen	general
2	Jane	Smith	cardiology
3	Chris	Sanchez	allergy
4	John	Smith	general
5	Fran	Feigenbaum	endocrinology

Patient

ID*	First	Last	Birthdate	Phone
1	Kathy	Bantham	1948/06/28	718 555 1234
2	John	Corin	1939/10/27	212 555 1235
3	Laurence	Flanders	1961/07/30	614 555 1236
4	Keanu	Rennie	1964/09/02	201 555 1237
5	Michael	Lin	1909/08/25	212 555 1238
6	Jana	Hanson	1954/02/18	718 555 1239

Appointment – first two columns are foreign keys

PatientID (ref. Patient)	PhysicianID (ref. Physician)	Date	Time
1	3	2009/04/02	10 : 30
1	4	2009/04/03	11 : 15
2	2	2009/04/03	11 : 15
3	5	2009/04/04	14 : 00
4	1	2009/04/04	10 : 00
4	2	2009/04/04	10 : 00
5	5	2009/04/05	13 : 30
6	4	2009/04/02	15 : 30

(a) What are the names of the physicians that Kathy Bantham is seeing?

_____

(b) At what time on April 2nd does Jana Hanson have an appointment?

_____

(c) Name any physicians or patients that have overlapping (conflicting) appointments.

(d) A new patient, Carol Smith (born March 5th, 1973), just made an appointment with Dr. Jane Smith on April 7th at 9:15 AM. Add that information to the appropriate tables above.

4. When using an ATM, I present my bank card and also type in my PIN. Explain how this is an example of *two-factor authentication.*

5. Below is a table of jobs that we must schedule on a batch operating system. **Note the arrival times — a job cannot be scheduled before it has arrived!**

Job	Arrival time	Run time
J1	0	5 seconds
J2	0	4 seconds
J3	3	2 seconds
J4	5	4 seconds

   (a) Create a time-line to illustrate the First-Come First-Served (FCFS) strategy. It should include the start/stop times of each job.

   (b) Compute the average **turnaround** time of the four jobs using your FCFS time-line from the previous question.

   (c) Create a time-line to illustrate the Shortest Job Next (SJN) strategy. It should include the start/stop times of each job.

   (d) Compute the average **turnaround** time of the four jobs using your SJN time-line from the previous question.

6. This question is about planning by searching a state graph in AI. We will study the *8-puzzle,* in which the player slides eight tiles around on a 3×3 grid. The goal is to put the numbers in order, with the 'hole' in the lower right.

   Below is the start of a state space graph. The directions labeling the arrow transitions indicate that a numbered tile is moved *down* (or *up, left, right*) into the blank space. Complete the graph to show two more moves, and thus the path to the goal state: a solved puzzle.