1. Which of the following can be represented by a single binary digit?

   Select **two** answers.

   A. The position of the minute hand of a clock
   B. The remainder when dividing a whole number by 2
   C. The value of a Boolean variable
   D. The volume of a car radio

2. An online store uses 6-bit binary sequences to identify each unique item for sale. The store plans to increase the number of items it sells and is considering using 7-bit binary sequences. Which of the following best describes the result of using 7-bit sequences instead of 6-bit sequences?

   A. 2 more items can be uniquely identified.
   B. 10 more items can be uniquely identified.
   C. 2 times as many items can be uniquely identified.
   D. 10 times as many items can be uniquely identified.

3. Each student that enrolls at a school is assigned a unique ID number, which is stored as a binary number. The ID numbers increase sequentially by 1 with each newly enrolled student. If the ID number assigned to the last student who enrolled was the binary number 1001 0011, what binary number will be assigned to the next student who enrolls?

   A. 1001 0100
   B. 1001 0111
   C. 1101 0100
   D. 1101 0111

4. A cable television company stores information about movie purchases made by subscribers. Each day, the following information is summarized and stored in a publicly available database.

- The day and date each movie was purchased
- The title of each movie purchased
- The cities where subscribers purchased each movie
- The number of times each movie was purchased by subscribers in a given city

A sample portion of the database is shown below. The database is sorted by date and movie title.

Day and Date	Movie Title	City	Number of Times Purchased
Sat 01 / 05 / 2014	Movie A	Houston, Texas	1
Sat 01 / 05 / 2014	Movie A	Detroit, Michigan	2
Sat 01 / 05 / 2014	Movie B	Houston, Texas	1
Sat 01 / 05 / 2014	Movie C	Anchorage, Alaska	1
Sun 01 / 06 / 2014	Movie A	Wichita, Kansas	3

Which of the following CANNOT be determined using only the information in the database?

A. The date when a certain movie was purchased the greatest number of times
B. The number of movies purchased by an individual subscriber for a particular month
C. The total number of cities in which a certain movie was purchased
D. The total number of movies purchased in a certain city during a particular month

5. When a cellular telephone user places a call, the carrier transmits the caller's voice as well as the voice of the person who is called. The encoded voices are the data of the call. In addition to transmitting the data, the carrier also stores metadata. The metadata of the call include information such as the time the call is placed and the phone numbers of both participants. For which of the following goals would it be more useful to computationally analyze the metadata instead of the data?

I. To determine if a caller frequently uses a specific word

II. To estimate the number of phone calls that will be placed next Monday between 10:30 A.M. and noon.

III. To generate a list of criminal suspects when given the telephone number of a known criminal

A. I only
B. II only
C. II and III only
D. I, II, and III

6. Computers are often used to search through large sets of data to find useful patterns in the data. Which of the following tasks is NOT an example where searching for patterns is needed to produce useful information?

   A. A credit card company analyzing credit card purchases to identify potential fraudulent charges
   B. A grocery store analyzing customers' past purchases to suggest new products the customer may be interested in
   C. A high school analyzing student grades to identify the students with the top ten highest grade point averages
   D. An online retailer analyzing customers' viewing habits to suggest other products based on the purchasing history of other customers

7. The table below shows the time a computer system takes to complete a specified task on the customer data of different-sized companies.

Task	Small Company (approximately 100 customers)	Medium Company (approximately 1,000 customers)	Large Company (approximately 10,000 customers)
Backing up data	2 hours	20 hours	200 hours
Deleting entries from data	100 hours	200 hours	300 hours
Searching through data	250 hours	300 hours	350 hours
Sorting data	0.01 hour	1 hour	100 hours

Based on the information in the table, which of the following tasks is likely to take the longest amount of time when scaled up for a very large company of approximately 100,000 customers?

   A. Backing up data
   B. Deleting entries from data
   C. Searching through data
   D. Sorting data

8. A student is recording a song on her computer. When the recording is finished, she saves a copy on her computer. The student notices that the saved copy is of lower sound quality than the original recording. Which of the following could be a possible explanation for the difference in sound quality?

   A. The song was saved using fewer bits per second than the original song.
   B. The song was saved using more bits per second than the original song.
   C. The song was saved using a lossless compression technique.
   D. Some information is lost every time a file is saved from one location on a computer to another location.

9. Two lists, *list1* and *list2*, contain the names of books found in two different collections. A librarian wants to create *newList*, which will contain the names of all books found in either list, in alphabetical order, with duplicate entries removed.

For example, if *list1* contains ["Macbeth", "Frankenstein", "Jane Eyre"]

and *list2* contains ["Frankenstein", "Dracula", "Macbeth", "Hamlet"],

then *newList* will contain

["Dracula", "Frankenstein", "Hamlet", "Jane Eyre", "Macbeth"].

The following procedures are available to create *newList*.

Procedure	Explanation
Sort (list)	Sorts `list` in alphabetical order and returns the resulting list.
Combine (list1, list2)	Creates a new list consisting of the entries from `list1` followed by the entries from `list2`. The resulting list is returned.
RemoveDuplicates (list)	Iterates through `list`. If any two or more entries have the same value, the duplicate entries are removed so that any entry appears at most once. The resulting list is returned.

Which of the following code segments will correctly create *newList* ?

A. *newList* ← *Combine (list1, list2)*
   newList ← *Sort (newList)*
   newList ← *RemoveDuplicates (newList)*

B. *list1* ← *Sort (list1)*
   list2 ← *Sort (list2)*
   newList ← *Combine (list1, list2)*
   newList ← *RemoveDuplicates (newList)*

C. *list1* ← *RemoveDuplicates (list1)*
   list2 ← *RemoveDuplicates (list2)*
   newList ← *Combine (list1, list2)*
   newList ← *Sort (newList)*

D. *list1* ← *RemoveDuplicates (list1)*
   list1 ← *Sort (list1)*
   list2 ← *RemoveDuplicates (list2)*
   list2 ← *Sort (list2)*
   newList ← *Combine (list1, list2)*