

Practice Examination

CSC222 Geographic Information Systems

18 November 2014

1. The confluence of the Allegheny and Monongahela Rivers in Pittsburgh, Pennsylvania forms which river? That third river carries barges past Cincinnati, Ohio and Louisville, Kentucky to Cairo, Illinois, where it flows into the Mississippi River.
2. Gotland is the largest island in Sweden. In which body of water is it located?
3. The Constitution of the United States requires a census every ten years. The size of a state's congressional delegation may increase or decrease following a census. Did Arizona gain or lose a representative after the 2010 census?
4. Monks from which country introduced Buddhism to Japan?
5. Approximately when did Neanderthals disappear?
6. Geologists who are looking for evidence of the impact of meteors on earth look for unusually high concentrations of which element in the region around a suspected impact?
7. Greece can be divided into three parts:
 - the mainland
 - numerous islands
 - the PeloponneseWhat is the Peloponnese?
8. Where could you find records of voting in the United States House of Representatives? Which Linux command could you use to retrieve many files at once?
9. Rates of crime in the region where an employer's offices are located might influence your choice to accept or decline an offer of employment. Identify one of the five states where the rate of crime is lowest.
10. To what are programmers referring when they speak of an "API?"

11. Immigrants from which country on the Horn of Africa and from which landlocked nation in southeast Asia have settled in Minnesota in recent decades?
12. The World Wide Web is what computer scientists call a “client-server system.” When you connect to the World Wide Web, you use (at least) two computers. There is the distant computer that holds the pages you want to view and there is the computer on your desk (or in your hands or lap) on which you view the pages. The client is your computer—it sends requests to the server. The server responds by sending pages to the client. Software engineers write programs that run on servers using many different programming languages, but today there is one dominant and ubiquitous language that is used on the client side.

What is the client-side programming language?

13. Imagine that you are the regional sales manager for a company that is based in Des Moines, Iowa. You have clients in the capital cities of six neighboring states:
- Saint Paul, Minnesota
 - Madison, Wisconsin
 - Springfield, Illinois
 - Jefferson City, Missouri
 - Lincoln, Nebraska
 - Pierre, South Dakota

You would like to visit each of your clients. You would like to find the shortest route that will take you from Des Moines to each of the other cities and then back home. You have a table that lists distances between cities. Its rows and columns are labeled with the names of the cities—at the intersection of each row and column is the distance between the corresponding cities.

Finding the shortest path is easy. There are only $6! = 720$ different ways to order the six cities. This is because you have six ways to choosing the first city that you will visit after leaving Des Moines, and then you have five choices for your second choice, four choices for your third destination, and so on.

$$\begin{aligned} 6! &= 6 \times 5 \times 4 \times 3 \times 2 \times 1 \\ &= 720 \end{aligned}$$

You need only compute the distance for each of the 720 possible routes and then choose the shortest route. A machine can do this in the blink of an eye.

And yet computer scientists believe that this problem is intractable. How do you resolve the apparent contradiction?

14. The popular algorithms for finding a shortest path between two points in a network and for finding a minimum spanning tree are greedy algorithms. What is a greedy algorithm?
15. You worked with raster and vector data. Give an example of each.
16. You used logical operators to select hospitals on a map of California and in an exercise with the Cohen Sutherland algorithm.

Which of these tables describes the OR operator? Which describes the AND operator?

+	0	1
0	0	1
1	1	1

×	0	1
0	0	0
1	0	1