

PLSCS 2200: Intro to Mapping and Spatial Analysis with GIS
Fall 2021

Module 11 Answer Sheet: How to Perform Network Analysis in ArcGIS Pro

Question 11.1 (3 points): Use the identify tool to familiarize yourself with each of the 16 libraries. **Briefly sketch out the locations of the 15 points, as well as their names (i.e., Austintown, Boardman, Brownlee Woods, etc.) and the initial number assigned to each one.** You are doing this for your own reference in future questions.

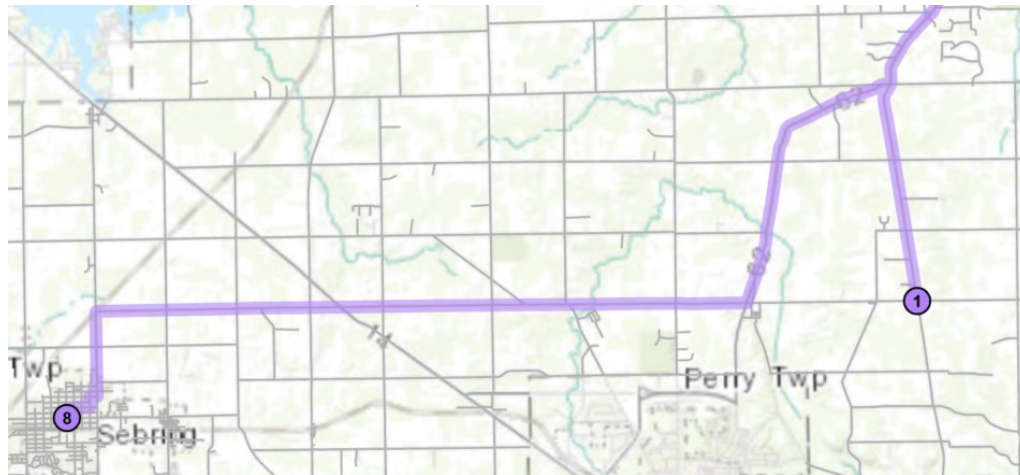


Question 11.2 (1 points): How long is the best route between the stops in miles? (Important Note: The length being reported back from Network Analyst is in the units of the network, which are feet.)

The total distance of the best route in miles is **143mi.**

Question 11.3 (2 points): In examining the driving directions, do you see any particular directions that seem non-intuitive to a driver? (Hint: Chances are you are unfamiliar with driving throughout Mahoning County, Ohio. However, look for any directions that drivers may be unlikely to take, such as switching to an interstate for very short distances, or similar kinds of activities.) Why would ArcGIS provide these kinds of directions?

A decision a driver would change is skipping library 8 when travelling to library 1. ArcGIS would provide these directions because it is going to the libraries in order. After 1, the next library is 2 which is the Main Library. It has no intention of going to library 8 from library 1.



Question 11.4 (1 point): How long is this new, best route (libroute2) between the libraries (in miles)?

The total length of this route is **86mi.**

Question 11.5 (1 point): How does libroute2 differ from libroute1 (and not just “it’s shorter” or “it’s longer”—how specifically has the route itself changed in relation to the stops and the computedpath)?

The route goes through the libraries that are away from the center of the city (farther from the cluster) and then reaches the cluster at the end.

Question 11.6 (1 point): How long is this new, best route (libroute3) between the stops (in miles)?

68mi.

Question 11.7 (5 points): How is the arrangement of stops different among the three routes? (That is, which stop is visited first, which is visited second, and so forth, in each of the three routes? List them as #1 through #15 for each route.)

In this example, keeping the first and the last stop is not the best decision in decreasing travel distance. **Sometimes the best route is to take the libraries that are connected in a way that decreases distance.** For example, the third route does not go through the empty land in order to reach library 14 from 8.

Route 1: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15

Route 2: 1, 8, 14, 6, 13, 10, 12, 9, 5, 11, 4, 3, 2, 15, 7

Route 3: 8, 1, 6, 13, 10, 12, 9, 5, 11, 4, 3, 2, 15, 7, 14

Question 11.8 (2 points): You have three shortest paths between the libraries. What is so special about **the specific route taken by libroute3** to make it the shortest of the three?

Route 3 starts from one isolated library (library 8) and goes into the cluster of libraries. Then it ends in the other isolated library with no extra distance.

Question 11.9 (1 point): What is the length (in miles) of libroute4 with these barriers?

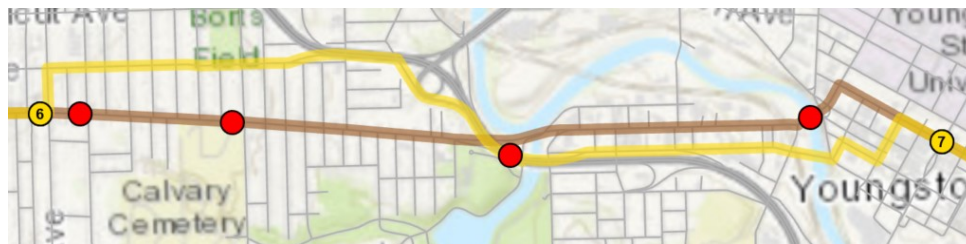
71mi.

Question 11.10 (2 points): What changed between libroute3 and libroute4 with the addition of the barriers?

The route to all the libraries changed. The route is going to the isolated libraries (library 8 and 14) first instead of going through the cluster and out. However, the route from library 15 to 2 is similar but one street upward.

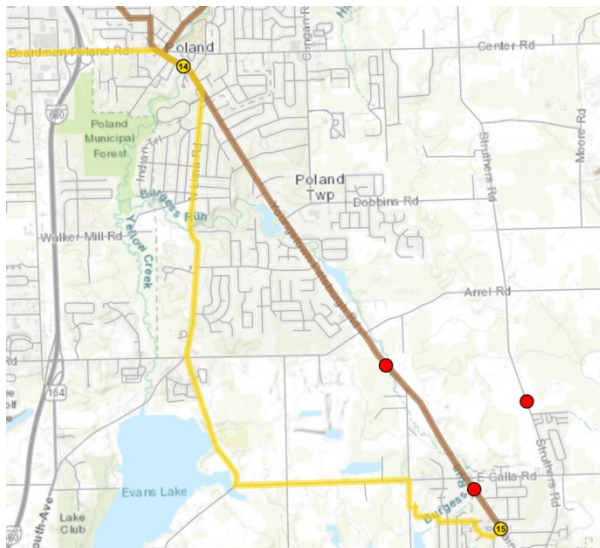
Question 11.11 (2 points): How (specifically) did the path between West and Main change?

From West library, the route goes one street down from the route3 line (brown line) and when it crosses the bridge, it goes one street above from the route3 line. It does not avoid one barrier.



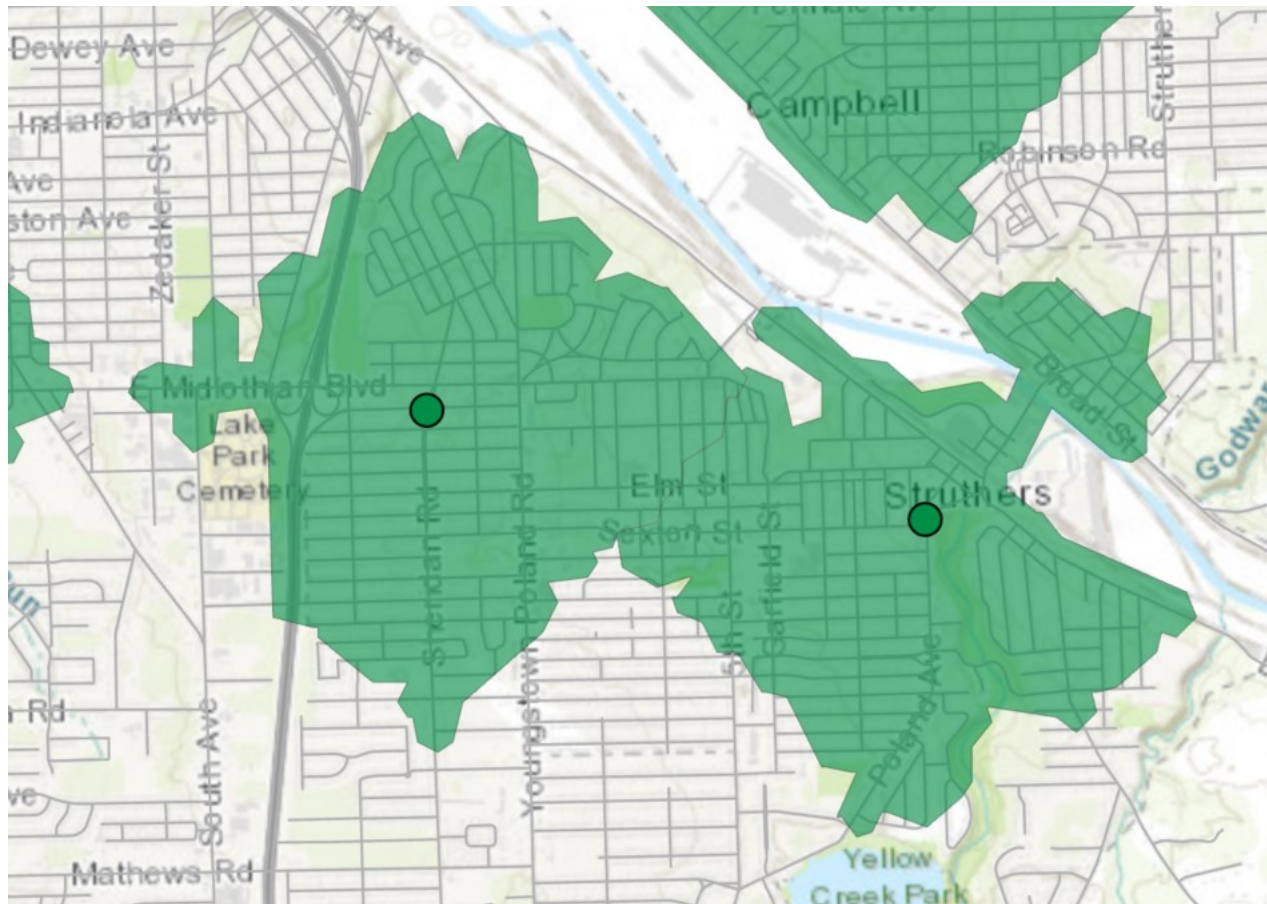
Question 11.12 (2 points): How (specifically) did the path between Springfield and Poland change?

Route4 (yellow line) goes on a longer route to reach Springfield library from Poland. It avoids the two barriers that were on the route3 (brown line).



Question 11.13 (3 points): Are there any overlapping service areas? If so, which libraries have overlapping areas within the 1-mile regions? (Your answer may be something like “Austintown Library and Main Library overlap service areas within 1 mile.”)

No, there are no overlapping services. However, I am unsure if there are any overlaps between the libraries Brownlee Woods and Struthers.



Question 11.14 (2 points): Which library is considered the closest facility for Western Reserve and how long is the route to that library (in miles)?

The closest library to Western Reserve is Tri Lakes with 5.8mi.

Question 11.15 (2 point): Which library is considered the closest facility for Ursuline High School and how long is that route (in miles)?

The library closest to Ursuline High School is Main Library and it is 0.7mi.