CSPB 3702 - Reckwerdt - Cognitive Science

Started on	Sunday, 1 October 2023, 10:46 PM
State	Finished
Completed on	Sunday, 1 October 2023, 11:57 PM
Time taken	1 hour 10 mins
Grade	Not yet graded

Question **1**

Complete

Marked out of 25.00

This is where you will attach your **PDF** of the Graph Theory Workbook.

IMPORTANT:

If this item is required to complete the project.

If the workbook is not submitted or substantially incomplete, the project will receive a 0.

Taylor Larrechea - Graphs and Networks Workbook.pdf

Question **2**

Correct

Mark 2.00 out of 2.00

Which statement best describes what it means for two figures to be topologically equivalent?

a. **They are identical to one another**

b. **They have the same number of edges and vertices**

c. **They can be stretched or bent into the same shape, without changing the number of degrees each vertex has** ✔

d. **They both form a simple closed curve**

Your answer is correct.

Question **3**

Correct

Mark 2.00 out of 2.00

Which statements are true of simple closed curves?

Select one or more:

- [x] a.
  A simple closed curve is topologically equivalent to a circle ✔
- [x] b.
  A simple closed curve does not intersect itself and allows you to pass through every point just once while tracing it ✔
- [x] c.
  A simple closed curve forms two regions: inside and outside the curve ✔
- [ ] d.
  The numbers 0 and 8 are both examples of simple closed curves

Your answer is correct.

Question **4**

Correct

Mark 2.00 out of 2.00

If a point is inside a simple closed curve with a straight line going outside the curve, how many times could the line cross the curve?

Select one or more:

- [ ] a.
  2
- [x] b.
  3 ✔
- [ ] c.
  4
- [x] d.
  5 ✔
- [x] e.
  999 ✔
- [ ] f.
  0

Your answer is correct.

Question **5**

Correct

Mark 2.00 out of 2.00

A network consists of vertices and edges, and each vertex has a degree. What is the degree of a vertex?

a. **The number of edges within the network**

b. **The number of edges that connect to the vertex** ✔

c. **The number of vertices in the network**

d. **The number of ways a network can be traveled**

Your answer is correct.

Question **6**

Correct

Mark 2.00 out of 2.00

If a network has 2 even vertices and 2 odd vertices, can it be traveled?

a. **Yes, but some networks can only be traveled starting at certain vertices.** ✔

b. **Yes, it can always be traveled starting at any vertex**

c. **No, it can never be traveled**

Your answer is correct.

Question **7**

Correct

Mark 2.00 out of 2.00

A network of three or more vertices can be traveled if:

Select one or more:

- [x] a. **There are two vertices of an odd degrees and the rest are even** ✔
- [x] b. **All vertices are of an even degree** ✔
- [ ] c. **All vertices are of an odd degree**
- [ ] d. **There are two vertices of an even degree and the rest are odd**
- [ ] e. **All vertices are of two or more odd degrees**

Your answer is correct.

Question **8**

Incorrect

Mark 0.00 out of 2.00

What definition best describes an Euler path?

- (•) a. **A continuous path that visits every edge and of a network and ends at the same point in which it started** ✖
- ( ) b. **A continuous path that visits every vertex of a network exactly once**
- ( ) c. **A continuous path that visits every edge of a network, but able to pass over them multiple times**
- ( ) d. **A continuous path that visits every edge of a network exactly once**

Your answer is incorrect.

Question **9**

Correct

Mark 2.00 out of 2.00

How is a Hamilton path different from an Euler path?

a. **A Hamilton path does not require a continuous path**

b. **A Hamilton path requires that every edge is crossed**

c. **A Hamilton path only requires that every vertex be visited** ✔

d. **A Hamilton path is a another name for an Euler path**

Your answer is correct.

Question **10**

Correct

Mark 2.00 out of 2.00

What is the relationship between a network having an Euler path and having a Hamilton path?

a. **If a network has an Euler path, it will have a Hamilton path**

b. **If a network has a Hamilton path, it will have an Euler path**

c. **A network can have either an Euler path or a Hamilton path, but not both**

d. **A network can an Euler path, a Hamilton path, both paths, or neither paths** ✔

Your answer is correct.

Question **11**

Correct

Mark 2.00 out of 2.00

Can a tree contain a simple closed curve?

a. **Never** ✔

b. **Yes, but only at starting point**

c. **Yes, at any point**

Your answer is correct.

Question **12**

Correct

Mark 2.00 out of 2.00

What is the diameter of a tree?

a. **The range of the number of edges a path can have within a tree**

b. **The smallest number of edges a path can have**

c. **The largest number of edges a path can have** ✔

d. **The total number of edges in each path**

Your answer is correct.

Question **13**

Correct

Mark 2.00 out of 2.00

Which of the following statements are true?

Select one or more:

a. **Trees of the same diameter will be topologically equivalent** ✖

b. **Trees that are topologically equivalent will have the same number of edges** ✔

c. **Trees that are topologically equivalent will have the same number of vertices** ✔

d. **Trees that are topologically equivalent will have more vertices than edges** ✔

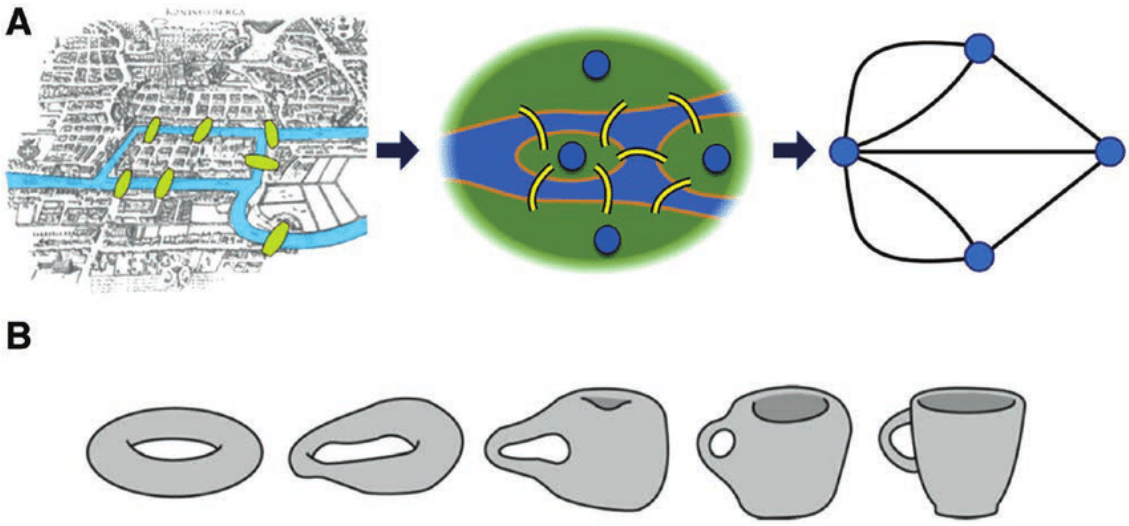
Your answer is correct.

Question **14**

Complete

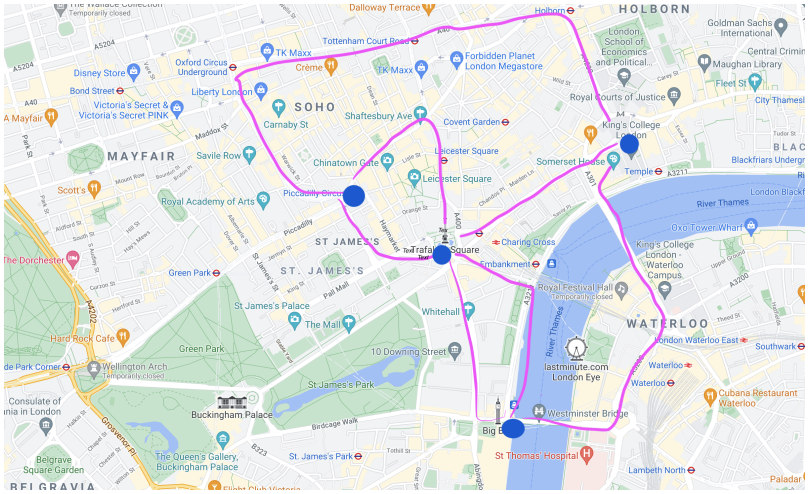
Marked out of 5.00

Here is an image from RearchGate showing how the paths through the bridges is transformed to a fundamental shape - just as a doughnut and coffee mug are the 'same' topologically.



In fact, many many paths are the same fundamental network.

For example, these paths paths between Big Ben, Piccadilly Circus, Trafalgar Square and King's College are also the same network as the Bridges problem:



In fact, there are an almost infinite variety of similar paths using bridges. roads and paths.

Create your own topologically equivalent path **(specifically equivalent to the Bridges Question)** of using your hometown, or favorite city or park using 4 landmarks using bridges, paths or roads.

*****So your map can include any landmarks you like, and needs to be topologically equivalent to the Bridges of Konigsberg network. *****

Upload a screenshot directly (by using the picture icon in the menu - not as an attachment) of your network and describe why you chose it.

This network is a network of four land marks from my home town; Centenial park, the Middle School, and Ice Cream Shop, and Morrow Draw Trail. I chose this network because these were common paths that I took while in Middle School in my hometown so I know them pretty well. There were many days that I walked between some of these land marks so I know them pretty well.

IMG_0464.jpg

Question **15**

Correct

Mark 5.00 out of 5.00

Using your network, can you find one or more Hamilton Paths through the nodes of the network you have made?

- a. Yes, there are several Hamilton paths thru the network. ✔
- b. Yes, there is exactly one Hamilton path thru the network.
- c. This cannot be answered in a multiple choice question because everyone in the class has created a different network.
- d. No, because the degree is 5.
- e. No, because traveling salesmen problem are not allowed in this city.

Your answer is correct.

Question **16**

Complete

Marked out of 5.00

If you can, take a walk with a friend who believes there is an Euler path thru your network (or imagine this).

Because he is so stubborn, the only thing you can do now is brute force this and try every possible path and see if any of them are an Euler path.

- How many paths are there for you and your friend to try?
- Explain how you figured out all possible paths.
- How do you know when you have tried all of them?

(Hint: once you hit a path length 6 that hasn't covered all edges, you know it won't work.)

(Not looking for perfect answer, just have a go and explain your process.)

In short there is not an Euler path because this would require crossing many paths multiple times, and that violates what an Euler path is. I had a hard time counting all the possible paths, and I came up with about 25 total paths someone can take in this network. I simply went to each network and counted the possible paths that could be taken from each starting point and then added the other paths at the next vertex. I don't entirely know how you would know if you tried them all other than starting from each vertex and then counting the number of paths that you take by returning to each node. This resembles a depth first search algorithm and going back to the previous vertex and taking a different path each time.

Question **17**

Complete

Marked out of 5.00

Explain to your friend another way to show there is not an Euler Path thru your network.

For an Euler a path, a network can have at most two vertices with odd degree and the rest even or all of the vertices have to be of even degree. In the case of this network, every vertex is of odd degree and therefore it cannot have an Euler path.

However, there is a way that we can take a Hamilton path since we don't have to go down every path in the network. We simply have to visit each vertex once and end up at the same vertex that we started at.

Question **18**

Complete

Marked out of 6.00

We know there is no possible solution to the question:

Find an Euler Path thru the network represented by the Bridges of Konigsberg.

It is unsolvable. Which means a solution can never be found.

Similarly, the trisection the angle with ruler and compass (that we saw in Module 1) also is an unsolvable problem. And yet, again and again people insist they have finally "found" a solution.

Why do you think it is harder for people to grasp the unsolvability of the angle question (or is it harder to grasp?)

What does unsolvable mean to you?

Does the fact that a question is unsolvable make it uninteresting and/or unimportant?

Please answer with 2 -3 paragraphs.

Unsolvable to me means that problem does not have at least one distinct answer. This should not be confused with difficult problems, because difficult problems can be solved. However, an unsolvable problem can be shown to be impossible to solve and that is what makes it unsolvable. Unsolvable problems are very interesting, because most people believe that every problem can be solved if you put in enough effort and work towards it. However, this could not be farther from the truth.

I think it is hard for people to grasp unsolvable problems because maybe they are thinking that there just isn't some form of logic someone has found to answer the question at hand. It's kind of like the question of if there is a God or not. Regardless of what you believe, if you are an Atheist or a believer, this problem is not really solvable because of the mechanism in which someone would have to use to solve such a problem. I think people tend to get very uncomfortable with the concept of someone not knowing something. It is too often that people refuse to keep their mouths shut when they don't know something and instead they blurt out something that they may not completely understand. Saying, "I don't know" or "I don't even know if that can be solved" are phrases that too many people are reluctant to utter in a lot of situations.

I think there is a distinct difference between something being truly unsolvable and something not being able to be answered **yet**. If we could travel back in time to the Galilean days, people probably thought it was impossible to see planets with the definition that we see today. This is a fact that they did not have the technology to do so, but it is still possible for us to view them like we do today. Regardless, there is a fine line between a problem being impossible to solve and a problem being difficult. And both make people uncomfortable, but the former is one that most people struggle to understand most likely due to ignorance.