GIS – Final – Spring – 2020

Part 1: Answer the following questions:

Q1: Which of the followings is a metric geo-reference system?

  a. UTM

  b. Longitude/Latitude

  c. The National Grid of Great Britain

  d. All of the above

Q2: If the source of the data is not trusted, then the data is not _____
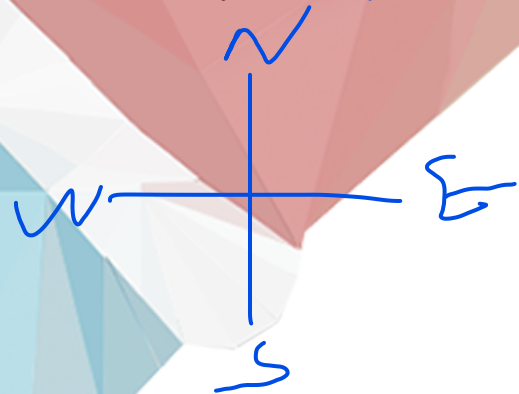
  a. Credible

  b. Complete

  c. Accurate

  d. All of the above

Q3: North and South directions in maps are, conventionally, associated with which Cartesian system axis?

  a. X axis

  b. Y axis

  c. λ axis

  d. Ø axis

Q4: The PLSS system of USA is:

  a. maps of lands ownership.

  b. a cadaster system

  c. maps of lands boundaries

  d. All of the above

Q5: The degree of ==connectivi==ty between two map features is called _____

    a.   proximity

    b.   ==adjacency==

    c.   contiguity

    d.   neighborhood

Q6: In ArcGIS, the coordinates of map features is physically stored in _____

    a.   flat files

    b.   Geo-reference files

    c.   ==Shape files==

    d.   All of the above

In ArcGIS, the coordinates of map features is physically stored in c. Shape files.

Q7: Which of the followings is a characteristic of Raster maps?

    a.   they include points, lines, and polygons

    b.   features can be counted

    c.   features can overlap

    d.   ==None of the above==

Q8: Vector maps have high resolution because _____

    a.   Only the coordinates are stored and not the actual lines.

    b.   file size is normally smaller than raster

    c.   Only significant features are stored

    d.   ==All of the above==

Q9: Which of the following original scales will provide the most details on a map?

    a. 1: 100000000

    b. 1: 50000

    c. 1:5000

    d. 1: 25000

Q10: Which of the following file extension(s) are part of the ESRI's shape file

    a. .shx

    b. .dbf

    c. .shp

    d. All of the above

Q11: The _____ images are not useful as a GIS data source

    a. X-Ray

    b. UV

    c. Thermal IR

    d. All of the above

d. All of the above

X-ray, UV, and thermal IR images are not typically useful as a GIS data source because they do not depict visible features on the Earth's surface. X-ray images are used to visualize internal structures of an object, ultraviolet images are used to detect certain types of materials or organisms, and thermal infrared images are used to detect temperature differences. While these images can be useful for certain types of analysis, they are not typically used to create GIS data because they do not show visible features that can be easily located on the Earth's surface.

Q12: How many unique satellite signals are needed by a GPS device to calculate the position of a real-world feature?

    a. Two

    b. Four

    c. Three

    d. Five or more

Q13: . Normally _____ points around the map are needed to establish a proper georeference.

a. One

b. Four

c. Three

d. Five

Q14: Which database data is used to determine if a point is within a polygon?

a. Attribute

b. Geometry

c. Topology

d. All of the above

Q15: Which geographic data model is most suited to support cadasters?

a. Network model

b. Raster/Grid model

c. Triangulated Irregular Network model

d. Vector and topological model

Part 2: Consider the following table to answer the questions below: (10 Marks)

Bear ID	Gender M = Male F = Female	Date of Birth (year)	Trip Start (Long, Lat) In Degrees	Trip End (Long, Lat) In Degrees	Health 1 = very Healthy . 5 = Unhealthy	Hair Thickness 1 = Not thick . 6 = Very thick	Environment Temperature (°C)
001	M	2001	+155.6, -60.1	+151.6, -63.1	1	6	-2
002	M	1997	+151.6, -68.1	+149.2, -55.1	2	5	-3

003	F	1994	+149.2, -55.5	+146.7, -59.8	5	2	-4
004	M	1995	+146.9, -59.2	+157.3, -60.9	3	3	-2
005	M	2001	+159.0, -42.1	+151.9, -68.7	2	3	-2

Q1: Write the attribute title(s) of all **Qualitative** data attributes.

Q2: What is the attribute(s) that is missing from the table above that would improve the quality of the data? and which attribute would be improved?

Q3: Which of the above attributes are/is **nominal** attribute(s)?

Q4: In which quarter of the earth (NE, NW, SE, or SW) are the above bears located?

Q5: What is the length of the trip of bear 001, considering that it is done in a straight line?

Part 3: Consider the following "undirected" chains' topology table which describes the street topology of the below map. (10 Marks)

Chain	Length (Km)	Average Speed (Km/h)	Time (Minute)
C1	4	5	
C2	2	40	
C3	4	60	
C4	5	60	
C5	3	18	
C6	4	60	
C7	6	10	
C8	7	14	
C9	9	9	
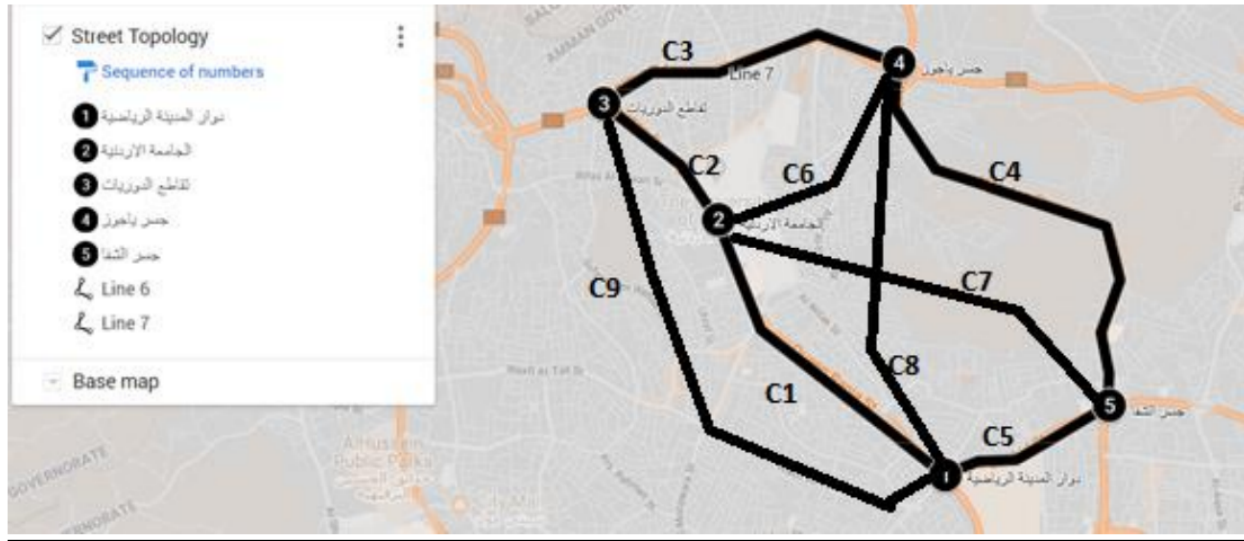
Q1: Apply Dijkestra's algorithm to find the Shortest Route (distance) from Node (1) "دوار المدينة الرياضية" to node (3) "تقاطع الدوريات".

   a. Fill in the Dijkestra's table after the last iteration of the algorithm i.e. only the last version of the table.

   b. Identify the shortest route from "Node 1" to "Node 3" and its total distance (Km) and its total time (minutes). You need to answer (ii) (a) below in order to find the time cost.

Q2: Apply Dijkestra's algorithm to find the Optimal Route (time) from Node (1) "دوار المدينة الرياضية" to node (3) "تقاطع الدوريات".

   a. Fill in the "Time" column in the above table by calculating the time needed to travel each chain.

   b. Fill in the Dijkestra's table after the last iteration of the algorithm i.e. only the last version of the table.

   c. Identify the optimal route from "Node 1" to "Node 3" and its total distance (Km) and its total time (minutes).

Q3 (bonus): How much time do we gain if we choose the optimal route compared with the shortest route?

Q4 (bonus): How much distance do we travel if we travel less if we choose the shortest route compared with the optimal route?

Answers:

Part 1:

Question No.	Answer Letter
1	D
2	C
3	A
4	B
5	B
6	B
7	D
8	A
9	A
10	D
11	A

12	A
13	B
14	B
15	B

Part 2:

Q1: Date of Birth, Trip Start (Long, Lat), Trip Ends (Long, Lat), Environment Temperature.

Q2: Missing-> time improve ->(Long, Lat) -> trip stat & end.

Q3: Bear ID, Gender.

Q4: SE.

Q5:   X=157.6 -151.6= 6 degree

y=68.1-60.1=8 degree

Distance =sqrt(x^2+y^2)= sqrt (36+64)=10km

Part 3:

Q1:

a.

Vertex (Node)	Shortest Route (Distance) from (جسر الشفا)	Previous Node	Incoming Chain	Visited 0 = No 1 = Yes
5	0			1
4	5	5	C4	1
3	8	2	C2	1
2	6	5	C7	1

1	3	5	C5	1

b. Shortest Route: 5->c7->2->c2->3

Total Distance:c7+c2= 6+2=8 km

Total Time: 36+3=39 min

Q2:

a.

Chain	Length (Km)	Average Speed (Km/h)	Time (Minute)
C1	4	5	48
C2	2	40	3
C3	4	60	4
C4	5	60	5
C5	3	18	10
C6	4	60	4
C7	6	10	36
C8	7	14	30
C9	9	9	60

b.

Vertex (Node)	Shortest Route (Time) from (جسر الشفا)	Previous Node	Incoming Chain	Visited 0 = No 1 = Yes
5	0			1
4	5	5	C4	1
3	9	4	C3	1
2	9	4	C6	1
1	10	5	C5	1

c. Optimal Route: 5->c4->4->c3->3
Total Distance:c4+c3=5+4=9km
Total Time: 5+4=9 min

Q3: 39-9=30 min.

Q4: 9km-8km =1km.