Name:____________________

CE 394K.3 GIS in Water Resources **Midterm Quiz** **Fall 2001**

There are 5 questions on this exam. Please do all 5. They are of equal credit.

1. ArcGIS can display three different types of vector data: shape files, coverages and feature classes. For each type, give an example from your homework problems of data of this type, and briefly explain what makes this data type different from the other two types.

Shapefile

Coverage

Feature Class

(b) Standardized data sources can be used as the basis of constructing a water resources base map for an area. Briefly describe the following data sources, and explain where you used them this semester.

Hydrologic Unit Code Watersheds

EPA River Reaches

National Elevation Dataset

National Hydrography Dataset

2. (a) A GIS analysis of a region of the United States involves a set of point data that have been supplied using latitude and longitude coordinate information in decimal degrees as shown below. Determine the corresponding values in Degrees, Minutes and Seconds

Point	Latitude	Longitude	Latitude	Longitude
1	35.2628	- 91.0011		
2	35.4040	- 91.2020		

(b) A point is located at (75°W, 28°N). In what UTM zone is this point located? What is the central meridian of this zone? In what units are UTM coordinates presented?

(c) The following table shows an excerpt from the attribute table of a counties coverage of the United States. What was the population of Delaware in 1999? How many counties in Connecticut have a population greater than 200,000? What does the field FIPS mean?

COUNTY_NAME	STATE_NAME	FIPS	POP1999
Archuleta	Colorado	08007	9764
Conejos	Colorado	08021	8058
Litchfield	Connecticut	09005	182092
Hartford	Connecticut	09003	827489
Tolland	Connecticut	09013	132846
Windham	Connecticut	09015	105378
New London	Connecticut	09011	244519
Fairfield	Connecticut	09001	842159
Middlesex	Connecticut	09007	151150
New Haven	Connecticut	09009	793776
New Castle	Delaware	10003	486839
Kent	Delaware	10001	125270
Sussex	Delaware	10005	139638
Washington	District of Columbia	11001	514869
Jackson	Florida	12063	45796
Holmes	Florida	12059	18893

3. Given the following grid of elevations, identify any cells that are pits (sinks) in the grid by drawing a circle around the elevation in that cell. Label the pit cells with the elevation they would have once the pits are filled.

67	56	49	52	54
52	48	37	38	43
58	40	42	39	40

Assuming the pits have been filled, determine the **flow direction grid** using the 8-direction pour point method and pit filled elevations. Indicate the flow direction by using an arrow in each cell on the grid below. You may ignore edge effects. Determine a flow direction assuming drainage to one of the cells in the given grid where possible.

Determine the **flow accumulation grid** corresponding to the D8 flow directions. Label each cell with the number of upstream cells draining into it.

4. A set of 6 junctions is shown in the diagram and an edge feature class is described in the corresponding table. You are building a geometric network of these features.

(a) Construct the network edge lines in the diagram.

(b) Fill in the adjacent junction and edge information in the Connectivity table

(c) If junction J4 is a sink, assign the flow direction on the edges using arrows.

(d) A watershed delineation has determined the drainage area for each edge as shown in the edge feature class table. Determine the area (km^2) draining to junctions J4 and J6.

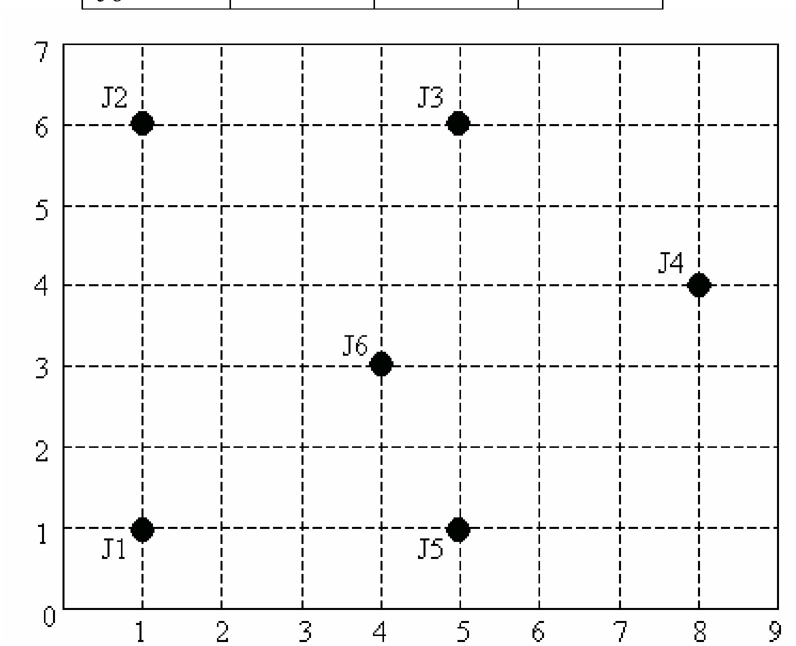
(e) Calculate the drainage density of this network

Edge Feature Class

Edge	**Junctions**	**Drainage Area (km^2)**
E1	J1, J6	23
E2	J2, J6	18
E3	J4, J6	12
E4	J3, J4	19
E5	J4, J5	17

Connectivity table

Junction	**Adjacent junction and edge**		
J1			
J2			
J3			
J4			
J5			
J6			



5. A set of 6 elevation points has been obtained by aerial photogrammetry, as shown in the table and figure below. Construct a Delauney triangulation of these points. Use this triangulation to draw the 50 m, 40 m and 30 m contours. Please make a neat solution for the contours but don't spend a huge amount of time trying to make them highly precise.

Point	**X**	**Y**	**Z (m)**
A	1	1	55
B	1	6	50
C	5	6	38
D	8	4	20
E	5	1	40
F	4	3	35