

Name: _____

CEE 6930 GIS in Water Resources Midterm Quiz

Fall 2000

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

1. The ArcView Geographic Information System can display different types of data. Briefly **define** each data type and give **an example** of a data theme that would be presented in this way.

Feature Data

Image Data

Grid Data

TIN Data

Tabular Data

(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

Hydrologic Unit Code Watersheds

EPA River Reaches

How can these two data sources be combined to form the base map of a river basin?

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 as follows. The analyst studies the “Latitude” and “Longitude” fields and realizes that the values given are a combination of degrees minutes and seconds, DDMSS. For example, 352628 is actually 35° 26′ 28″. Convert these points into the corresponding values in decimal degrees (LongDD, LatDD) to four decimal places.

Point	Longitude	Latitude	LongDD	LatDD
1	910011	352628		
2	912020	354040		
3	910804	352338		
4	910940	352810		
5	903204	361719		

(b) The analyst obtains a River Reach file whose projection coordinates are as follows:

```
Projection    ALBERS
Zunits        NO
Units         METERS
Spheroid      CLARKE1866
Xshift        0.0000000000
Yshift        0.0000000000
Parameters
  29 30  0.000 /* 1st standard parallel
  45 30  0.000 /* 2nd standard parallel
-96  0   0.000 /* central meridian
  23  0   0.000 /* latitude of projection's origin
0.00000 /* false easting (meters)
0.00000 /* false northing (meters)
```

What **map projection** and **earth datum** has been used for the River Reach data?

What is the **latitude** and **longitude** of the origin of the coordinate system of these data?

(c) Briefly explain how the two data sets (a) and (b) can be transformed into the same coordinate system so that they can be overlaid correctly.

3. Given the following grid of elevations

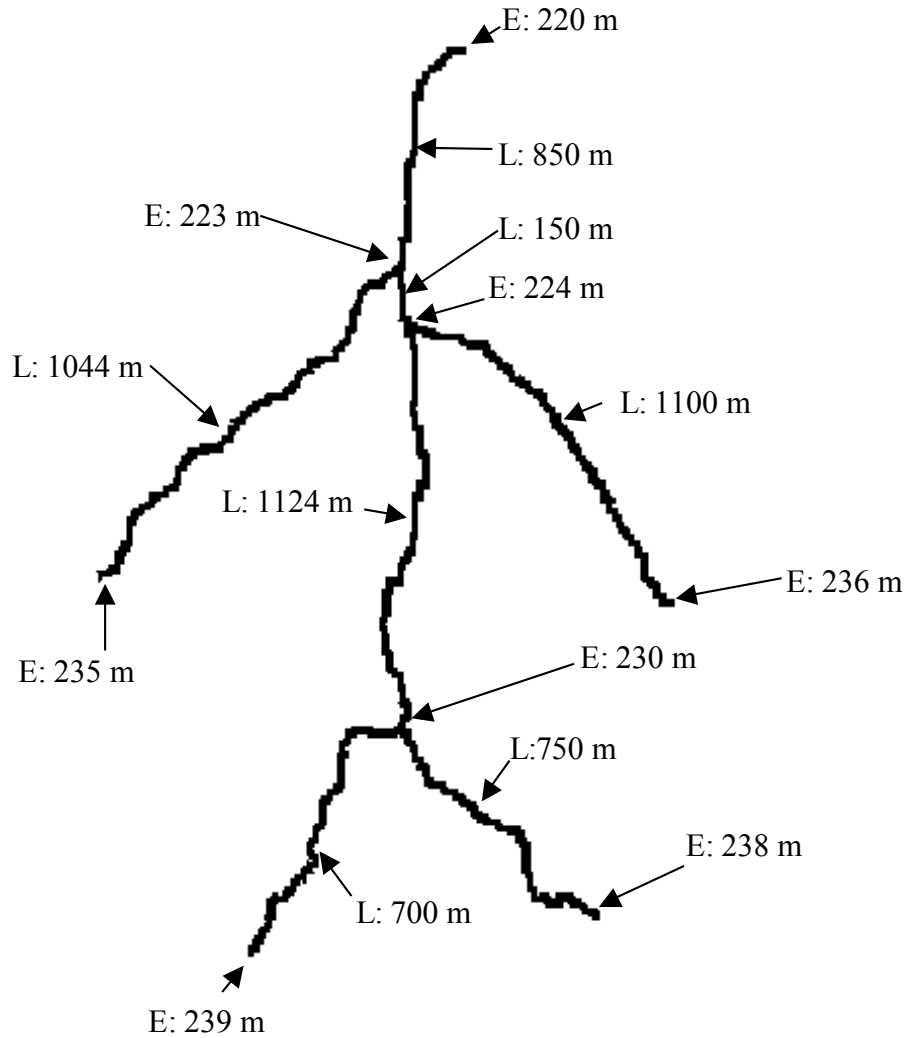
30	29	28
27	26	25
26	23	22

Determine the **flow direction grid** using the 8-direction pour point method. Indicate the flow direction by using an arrow in each cell.

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

If these are 100m cells, the mean annual rainfall over this area is 500mm, and 20% of the rainfall becomes runoff, determine the mean annual runoff from this nine-cell area in m^3/year .

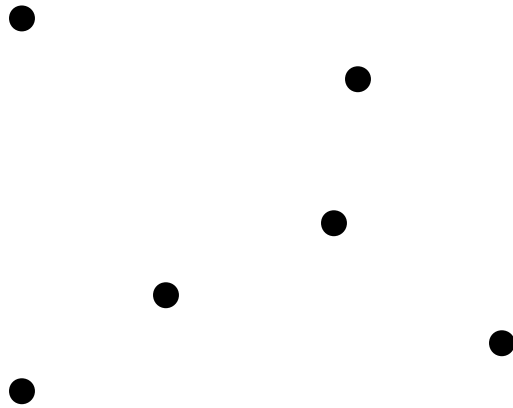
4. Consider the river network with elevations at junctions (denoted E:) and segment lengths (denoted L:) (both in meters) shown



- Identify and label on the drawing which of the 7 streams are first order and which are second order.
- Determine the average stream drop for first order streams and second order streams.
- Determine the drainage density. The total area drained by this watershed is 7.1 km^2 .

d) Briefly explain the basis for deciding upon a support area threshold to define streams using the stream drop test.

5. A set of elevation points for an area has been obtained by aerial photogrammetry, as shown below. Construct a Delauney triangulation of this area.



Briefly explain how to create a flood plain map using a Triangulated Irregular Network representation of the terrain surface and the HEC-RAS hydraulic model.

How can the discharge values be determined for the flood plain delineation?

If you wanted to describe quantitative information about the soils of a study area, what datasets could you draw on to obtain this information?

Explain the relationship between a soil **map unit** and soil **components**.