

UNIVERSITY OF SOUTH AUSTRALIA

FACULTY OF ENGINEERING AND THE ENVIRONMENT

School of Geoinformatics, Planning and Building

Semester 1, 2000

Spatial Information Systems 1 : 10237

Time Allowed : 2 hours + 10 minutes reading time

General Instructions to Candidates

Total Marks = 90

Attempt ALL SIX questions.

Marks for questions are indicated at the end of the question.

This is a closed book examination.

Please ensure front of answer book is completed with your name, student I.D. number, course and section of the examination (if applicable).

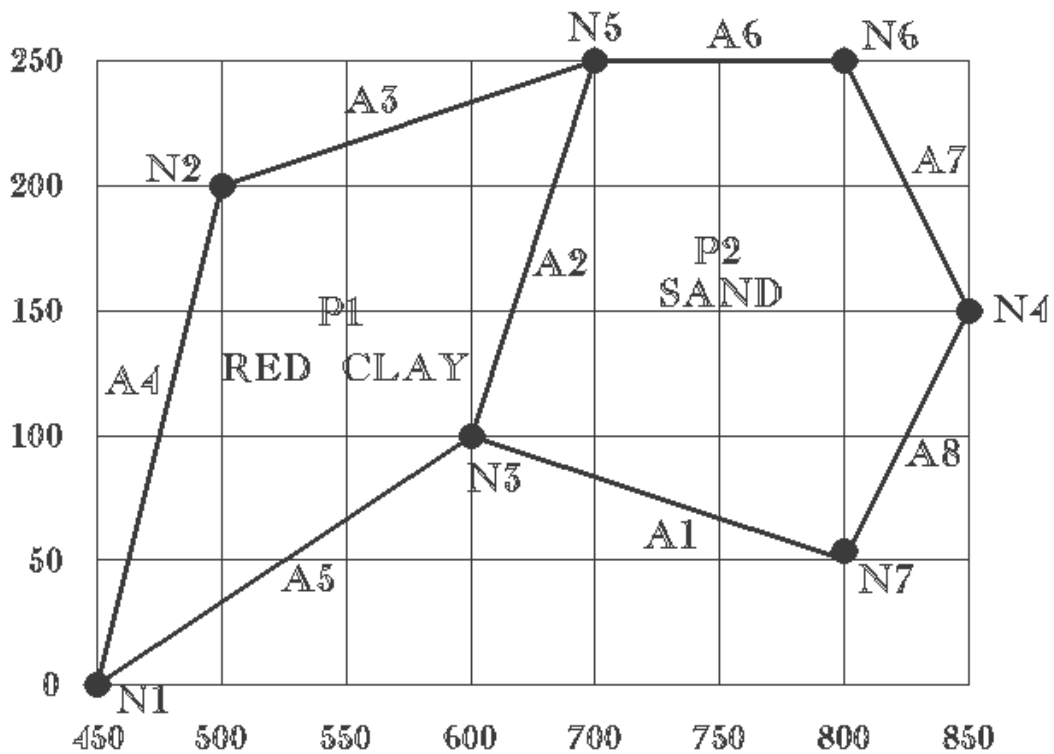
QUESTION 1

- a) What is a Geographic Information System (GIS) ? [3 marks]
- b) Give examples of the kind of questions a GIS can answer. [3 marks]
- c) What are spatial and aspatial queries? Describe the difference between them. [3 marks]
- d) What are the 4 major steps in a typical GIS project? Give a description of each step. [8 marks]

QUESTION 2

- a) What is Topology? [3 marks]
- b) Describe the topological concepts of connectivity, area definition and contiguity. [3 marks]
- c) Using the data contained in the diagram below derive the following:

- i) node attribute table
- ii) arc attribute table
- iii) polygon attribute table



[5 marks]

QUESTION 3

- a) The term ‘map’ is used to refer to any visual display of information. In practice there are 2 types of map.

- i) What are the 2 types of map ? [2 marks]
- ii) Give a brief description each. [2 marks]
- b) Thematic maps are important in spatial information systems. Give a brief description of the following thematic map types: Choropleth, Area class and Isopleth. [6 marks]
- c) What is a computer operating system? Give a brief description of the UNIX operating system. [5 marks]

QUESTION 4

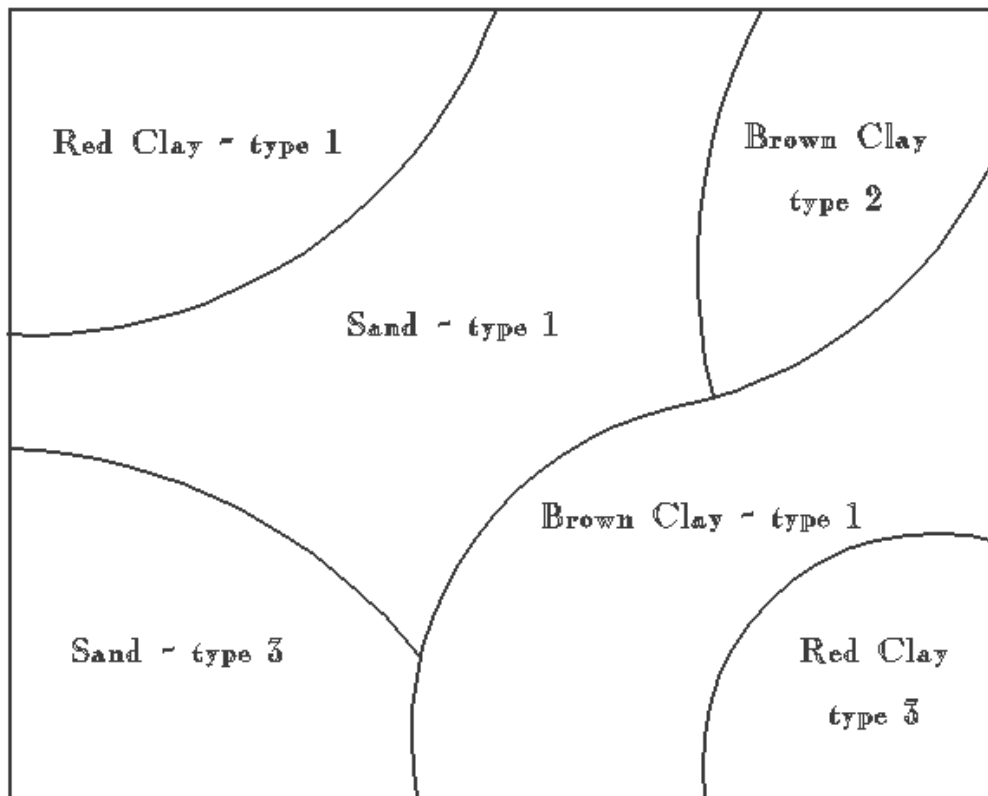
- a) GIS data structures are categorised into 2 main types
- i) Vector model
- ii) Raster model
- Compare and contrast both types. [5 marks]
- b) Discuss the following types of vector data models. Use diagrams where appropriate.
- i) Spaghetti model [4 marks]
- ii) Topological data model. [4 marks]
- c) Compare and contrast the spaghetti and topological data models with respect to data storage and data analysis. [3 marks]

QUESTION 5

- a) Describe 2 methods of capturing spatial data for use in a Geographic information system. [6 marks]
- b) Describe the steps involved in the process of capturing spatial data and adding spatial attributes to polygons. [5 marks]

QUESTION 6

- a) Define the following terms: resolution, orientation, value, zone and location with respect to a raster data layer. [5 marks]
- b) The diagram below shows soil types classified by a major soil group and a sub-type. Describe the steps that are required to reclassify and aggregate these polygons into the major soil groups: Red Clay, Sand and Brown Clay. Use diagrams to help describe each step in the process.



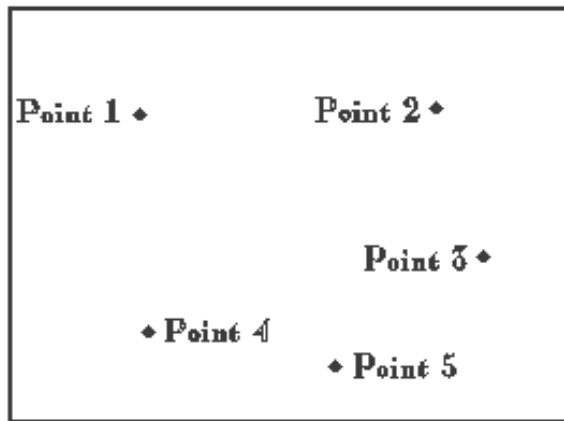
[6 marks]

c) Using the diagrams below explain how new attributes are assigned to features using the following topological overlay processes:

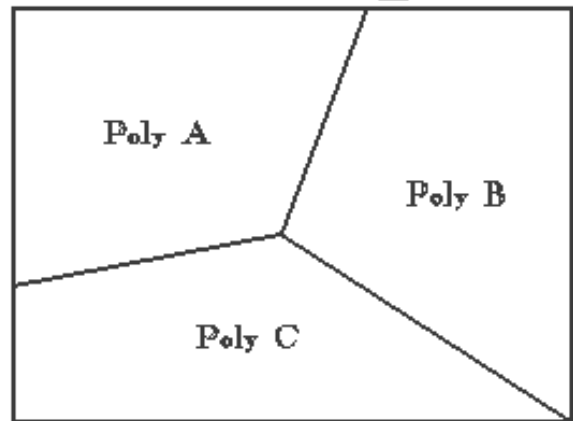
- i) Point in polygon
- ii) Line in polygon
- iii) Polygon on polygon

Illustrate your explanation with diagrams

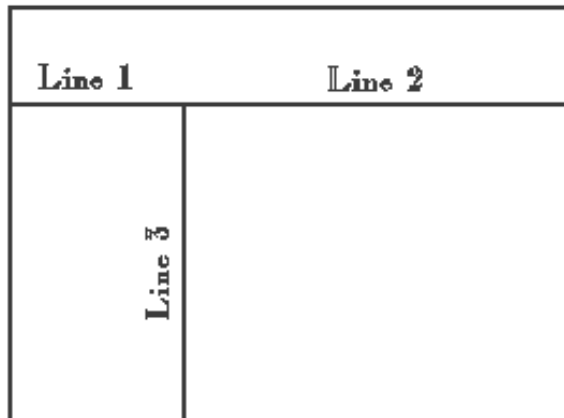
POINTS



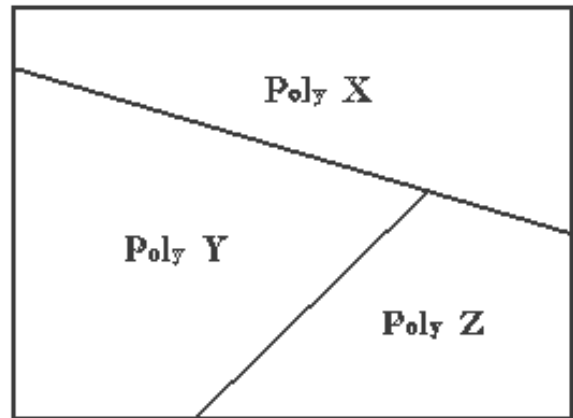
POLYGON_A



LINES



POLYGON_B



[9 marks]