UNIVERSITY OF SOUTH AUSTRALIA

DIVISION OF INFORMATION TECHNOLOGY, ENGINEERING AND THE ENVIRONMENT

School of Geoinformatics, Planning and Building

Semester 1, 2003

Introduction to Mapping Sciences : GEOE 1009 / 13048

Time Allowed **:** 2 hours + 10 minutes reading time

General Instructions to Candidates

Marks for questions are shown at the beginning of each question

Answer **ALL** questions from **Section A** and **ANY FOUR** questions from **Section B**.

Programmable calculators are permissible.

Please ensure the front of your answer books are completed with your name, student I.D. number, course and section of the examination.

SECTION A

QUESTION 1

(20 Marks)

A team of scientists comprising an ornithologist, an ecologist and a biologist approach you to design a map which shows information concerning three species of penguins which breed along a section (study area) of the Antarctic coast line. The information to be ideally shown on the map is summarised into the table below.

Penguin Species	Total population in study area	Total population in Antarctica	Number of breeding sites in study area	Population of species in each breeding site	Remains in Antarctica for winter ?	Preferred location for breeding site
Emperor	2,500	400,000	1	2,500	Yes	On ice protected by ice cliffs
Adelie	250,000	5,000,000	3	20,000 120,000 110,000	No	On rock and moraine close to sea edge.
Chinstrap	550,000	15,000,000	5	168,000 40,000 120,000 198,000 24,000	No	High on rocky islands close to coast

In addition to the above information the scientists would like to see the map show:

Boundary of coastline and islands
Areas of rock
Areas of permanent ice
Areas of winter sea ice
Areas that are glaciated
Breeding site locations

Discuss the design of the map that meets the scientists' objectives, paying particular attention to the map title and the use of colour and symbols.

QUESTION 2

(20 Marks)

A series of tourist maps has been requested by a government agency for the Clare Valley Wine District south of Adelaide in South Australia. These maps are to be published at a scale of 1:15000 in a booklet format (book size is A4) and on their web site.

Each book contains a general reference map of the area, with an index map to the 1:15000 maps. This book also contains tourist information for major towns, wineries, restaurants, and other local attractions. For this map book to be useful to interstate and overseas travellers the maps must contain specific information for tourists.

The web site must be interactive, but the maps must look like the published book.

The map series must contain several base datasets; relief (hillshade and surface model), watercourses, road networks (identifying road types and road names), buildings and significant structures (identified by symbology), vegetation structure for vineyards, orchards and native vegetation and prominent walking trails (eg. Riesling Trail). Distinctive symbology and text is required for cellar door wine sales outlet for each winery.

A general reference grid is required for each map. This reference grid should be user friendly and easy to interpret for all tourists.

a) Discuss in detail the design of this map series taking particular care to consider the issues of symbol and text design to meet the primary aim of the map series.

b) Briefly discuss how the maps could be published on the web using a GIS software. What other considerations would be required when looking at colours, symbols, and design on a web page map.

QUESTION 3

(12 Marks)

a) Most maps of the physical Earth make reference to scale, distance and coordinate. Explain the relationship between these metrics ensuring that the discussion encompasses the issues of geodetic datum and map projection

b) Describe the difference between conic and cylindrical map projections. Explain the concept and use of *secancy* in these projections.

SECTION B

QUESTION 4

(12 Marks)

a) There are several ways to describe colour systems.
   (i.) Explain the CIE system?
   (ii.) Where are RGB and CMYK used in the practical world?

b) What are the four basic geographic variables? Explain each of them and use real world features for examples.

c) During map compilation what do the terms "Separation" and "Registry" mean?

QUESTION 5

(12 Marks)

a) The best two methods to represent the landform surface in maps are contours and hill shading (separately and together).

   (i) Discuss and compare the use of contours and hill shading for representing the landform surface.
   (ii) To facilitate the interpretation of contours there are several widths and styles. List and briefly explain these.

b) List and explain the four most common schemes of classification of a statistical surface.

QUESTION 6

(12 Marks)

With brief comments, list the possible sources of data for the construction of maps which show:

a) Population and health statistics associated with climate data for a continent such as Africa or South America.
b) Topography, vegetation and drainage data for a new urban residential subdivision.

QUESTION 7

(12 Marks)

a) Explain the difference between "spectral colour" and "artificial colour".

b) There are eight different ways of geometric generalization. List and illustrate them, giving a brief explanation on how you would use that method on a map.

c) Why is lettering a map important and what considerations are needed to produce a good lettered map?

QUESTION 8

(12 Marks)

a) Generalisation is used frequently during mapping. Explain why you would generalise data on a map. There are two methods of generalisation, list them and explain the differences between them.

b) In 1799 Johann Georg Lehmenn developed a method to displays hills and mountains on a map. What was this method called and explain its advantages and dis-advantages.

c) What is the difference between "analog compilation" and "digital compilation" when compiling a map?

QUESTION 9

(12 Marks)

a) Map design is important to get right at the beginning of map compilation. If a map is to portray the information clearly and concisely, good design is imperative. Discuss the key elements to good map design, using diagrams if necessary.

b) In the function of lettering a map, there are four forms of text symbols. Briefly explain the forms and use examples.

c) In symbol design there are three classes of data / scale. Use a table matrix to briefly describe these classes.