

UNIVERSITY OF SOUTH AUSTRALIA

DIVISION OF INFORMATION TECHNOLOGY, ENGINEERING AND THE ENVIRONMENT

School of Geoinformatics, Planning and Building

Semester 1, 2002

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** three questions from **Section A** and **ANY** three 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

(25 Marks)

Several research scientists approach you for a map produce. The ecologist and her research assistant are interested in the survival of Yellow-footed Rock Wallaby (*Petrogale xanthopus*) within the Flinders Ranges. They believe that the reduction of wild goats and wild cats within the area are allowing the species populations to bounce back. There have been rumours among the locals that there have been sightings of the very rare Black-footed Rock Wallaby (*Petrogale lateralis*) in the same area. Using the information below, identify the layers of information that would be relevant for a thematic map.

Data	Date Collected	Field check method	Total population in study area	Number of breeding sites	Number of young under 12 months
Yellow-footed Rock Wallaby	1985	Ground Truth Transited line	50	4	6
Yellow-footed Rock Wallaby	1990	Ground Truth Transited line	56	3	4
Yellow-footed Rock Wallaby	1992	Helicopter	60	3	4
Yellow-footed Rock Wallaby	1995	Ground Truth Single point	78	4	10
Yellow-footed Rock Wallaby	2000	Light Aircraft Along rock face	102	6	18
Black-footed Rock Wallaby	2001	N/A	1 or 2	Less than 10	??
Wild Goat	1986	Light Aircraft	220	20	30
Wild Goat	1990	Light Aircraft	330	27	60
Wild Goat	1997	Helicopter	200	15	20
Wild Goat	1999	Light Aircraft	90	12	25
Wild Cat	1997	Helicopter	20	N/A	N/A
Watercourses Data	1992	N/A			
Road Data	1995	N/A			
Slope Data	2001	N/A			
Aspect Data	2001	N/A			

- a) Discuss in detail how you would portray the above data using colours, symbology, and text to depict any ecological trends and / or habitat locations.
- b) Discuss the map design, page size and additional data that would be required for the map-reader to interpret the map.

QUESTION 2

(20 Marks)

A series of tourist maps has been requested by a government agency for the McLaren Vale Wine District. These maps are to be published at a scale of 1:10,000 in a booklet format (book size is A4). Each book contains a general reference map of the area, with an index map to the 1:10,000 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 map series must contain several base datasets; relief (contours) at 5 metre intervals, watercourses, road networks (identifying road types and road names), buildings and significant structures (identified by symbology), vegetation structure for vineyards, orchards, and native vegetation. Distinctive symbology and text is required for cellar door 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.

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.

QUESTION 3

(17.5 Marks)

- a) List and briefly describe the four key elements which define a geodetic datum?
- b) In your own words briefly describe the Universal Transverse Mercator and Lambert map projections.
- c) Solve for the required value in each of the following situations making sure that you show all of your computational steps
 - i) An old survey plan of land subdivision shows a distance of 1200 links (ie. 12 chains) which measures 482.8 mm on the plan. What is the scale of the plan?
 - ii) A forest measures 172.0 mm by 106.5 mm on a 1:5,000 scale topographic map. What is the area of the forest on the ground?
 - iii) A topographic map of scale 1:2500 shows a section of road beginning at a contour of 78 m (AHD) and ending at a contour of 86 m (AHD) and which measures 78.5 mm in length on the map. What is the overall gradient of the section of road?

SECTION B

QUESTION 4

(12.5 Marks)

- a) In the colour system there are two types of systems, name each system. Using diagrams explain the differences.
- b) What are the four basic geographic variables, explain each of them and use real world features for examples.
- c) Why is colour important on a map?

QUESTION 5

(12.5 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) What does the term “continuous surface” mean?

QUESTION 6

(12.5 Marks)

- a) Map design is important to get right at the beginning of map compilation, if the map is to portray the information clearly and concisely, good design is imperative. Discuss the key elements to good map design, use diagrams if necessary.
- b) In the function of lettering a map, there are two forms of text symbols. One is called “literal symbol”. Briefly explain the other symbol.
- c) In symbol design there are three classes of symbols and three classes of data / scale. Use a table matrix to briefly describe the classes.

QUESTION 7

(12.5 Marks)

- a) Explain the difference between “spectral colour” and “artificial colour”.
- b) There are eight different ways of geometric generalisation , list them and give a brief explanation on how you would use that method on a map.
- c) “Layer tinting” has become a popular method of showing the landform surface in computer models. Explain the term “layer tinting” and how it would be used in a water catchment model for the Adelaide Hills.

QUESTION 8

(12.5 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.
- b) In 1799 Johann Georg Lehmann developed a method to displayed hills and mountains on a map, what was this method called , explain the advantages and dis-advantages to this method.
- c) Briefly explain why business today wish to use an Internet map server to disseminate geographic data and maps.