

**DEPARTMENT OF GEOGRAPHY, GEOINFORMATICS & METEOROLOGY
FACULTY OF SCIENCE
GGY 283 INTRODUCTORY GIS
FIRST SEMESTER TEST**

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TIME: 50 min

1. BASIC CONCEPTS AND TERMINOLOGY

1.1 Define a GIS.

(3)

Some definitions of a GIS are:

"A GIS is a computer system that can hold and use data describing places on the earth's surface"(Rhind, 1989)

"A geographical information system is a group of procedures that provide data input, storage and retrieval, mapping and spatial analysis for both spatial and attributes data to support the decision-making activities of the organisation."(Grimshaw, 1994)

"...a computerized system for the collection, storage, manipulation (analysis), and output of information that is spatially referenced."....

"What sets GIS apart from all other types of information systems are their reliance on spatial referencing as their organizing framework and their ability to perform geographic analysis."(Obermeyer and Pinto, 1994)

Definitions of a GIS

An organised activity by which people:

- **Measure aspects of geographic phenomena and processes**
- **Represent these measurements to emphasise spatial themes, entities and relationships**
- **Operate upon these representations to produce more measurements and to discover new relationships.**
- **Transform the representations to other frameworks (Chrisman)**
- **Produce information for decision-making**

1.2 Explain the difference between spatial and attribute data.

(2)

Spatial data – Geographical data or data with a location on earth

Attribute data – describes spatial data

1.3 Name the five main steps in the GIS process

(5)

Define the information project

Design the GIS model

Acquire the data

Analyse the data

Communicate the results

2. BUILDING A GIS MODEL

2.1 The population of Benoni is growing very fast. This leads to traffic congestion on the highways leading into the city. A new road that leads into the city is planned for the near future. Finances are a constraint and there is also a conservation area that should not be disturbed. The residents support the development of a new road but are worried about the influence of noise pollution on the value of their properties.(4)

Based on the above scenario formulate a research question and 4 criteria for the use in a GIS project

Research Question: Must be in the form of a question ending with a question mark.

Criteria based on above scenario

3. DESIGNING THE GIS MODEL OF REALITY

3.1 Discuss the difference between latitudes and longitudes.

(8)

Longitudes (also called meridians) cut through the poles.

If you cut a globe along a longitude you will always divide the globe in half.

All longitudes are equal in length.

The prime meridian (0) is called Greenwich

Lines of longitude are widest apart at the equator and closest at the poles.

Latitudes are lines that lie at right angles with lines of longitude.

They are concentric circles.

Each circle will have a different circumference.

The circle with the greatest circumference is called the equator.

At the poles a point represents the latitudes.

3.2 Name the three **basic and two advanced** spatial feature types that can be used to represent real world entities on computer.

(5)

Points, Lines, Polygons

Surfaces and Networks

3.3 Name the problems that can arise when representing real world entities on computer using the abovementioned feature types.

(4)

Real world dynamics

Scale

Definition

The data layer concept

3.4 Is the table below a database or a spreadsheet? Motivate your answer.

GIS key	Tree	Park	Indigenous
100	Fever Tree	Zita Park	Y
200	Blue gum	UP sports Grounds	N
300	Yellow Tree	Zita Park	Y
400	Black Wattle	Magnolia Dell	N

(6)

Database

- A database consists of rows and columns.
- Each row is called a record, and has a distinct record number.
- Each column is called a field, and has a distinct field name.
- Each record is unique, meaning no duplicates in terms of the table "theme".
- The fields form the structure of the database.
- Each field may only have one entry.
- Each record is equal in status.

3.5 Define the following terminology:

Accuracy - the faithfulness with which a spatial entity is represented

Compatibility - can be used together sensibly

Consistency- captured from the same source documents, time period and captured in a similar way

(3)

3.6 Name the different data sources of spatial and attribute data for the use in a GIS.

(6)

Maps

Satellite Images

Aerial photographs

Surveying and GPS

Statistical data

Soft data

3.7 Name the different methods that can be used to encode data in a GIS.

(4)

Manual Data Encoding

Digitising

Scanning

Electronic data transfer

TOTAL [50]