

UNIVERSITY OF KWAZULU-NATAL, DURBAN

School of Agricultural, Earth and Environmental Sciences
Geographic Information Systems ENVS211

Practical Test: 8 October 2012

Duration: 2 Hours

Total Marks: 80

Internal Examiners: Dr R Sookrajh, Dr N.S. Negetar (HC); Dr H.K. Watson (WVL)
Internal Moderator: Dr M Gebreslasie

Instructions:

Complete *Task 0* before you start *Tasks 1* to *4*. Each *Task* is worth 20 marks. Write the answers to questions on the corresponding line provided in the test scripts. When you have completed *Tasks 1* to *4*, open Microsoft Word 2010 document and type your Initials and Surname, Student Number and Computer Number at the top of the page. Then click **insert** on the **menu bar**, and **picture**, select the jpeg map created in *Task 1* and click **insert** and **save**. Do the same for maps created in *Tasks 2-4*.


Then, if you are a HC student email it to Sookrajhro@ukzn.ac.za and 200270416@stu.ukzn.ac.za , or if you are a WVL student email it to watsonh@ukzn.ac.za.

Round up all figures to one decimal place.



You are **not** permitted to leave the test venue until instructed to do so. When requested to stop writing remain seated without talking until all test scripts have been collected.

Initials and Surname: _____
Student Number: _____ Computer Number: _____

Important Information:

- All your test data is located on the **C:** drive of your computer and is your student number
 - When saving layers (shapefiles) or loading data using the **Add Data**  button, go to **C:\ your student number** and save or Add.
 - When opening or saving **Map Documents** go to **C:\ your student number** and open.
 - Work must be saved either as map documents or as layers (shapefiles) within your test folder (either **C:\ your student number**)
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Task 0: (To be completed before the test starts)

- Start ArcMap by clicking **Start** then **All Programs** then **ArcGIS** then **ArcMap**
 - Connect ArcMap to your test folder as follows:
 - Click the **Add Data**  button
 - Click the **Connect To Folder**  button
 - Select the drive: **C:\ your student number**
 - Click **OK** to close the **Connect To Folder** window
 - Click **Cancel**
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Task 1

20 marks

You are an environmental planner with the Ethekeweni Municipality and are currently working on a project in the vicinity of Davenport Road area which requires extraction of information regarding a range of social and natural features and their interaction. You have the following data:

- A layer of the Geology of KwaZulu Natal
- A layer showing the location of Schools in Durban
- A layer showing the Hospitals in Durban
- A layer of the Durban Magisterial District
- A layer showing the Location and Land uses of Davenport Road

- Open the map document called *Task 1* from your test folder.
- Clip the *Geology* of KwaZulu Natal to show the geology in the *Durban Magisterial District*. Call the Output Feature *Durban_Geology.shp* and save it to the *Task 1* folder. Add this layer to your map document.
- Remove the layer showing the *Geology* of KwaZulu Natal as well as the layer showing the *Durban Magisterial District* from the map document.
- Symbolize *Durban_Geology* using unique values to show the different geological types.
- Symbolize the Land Use of *Davenport Road* using unique values and place (**drag**) this layer at (**to**) the top of the Table of Contents.

Q.1.1 What geological types is Davenport Road is built on ?
_____ (2)

Q.1.2 Which type of Land Use is most represented along Davenport Road ?
_____ (2)

Q.1.3 What is the area of the Park?
_____m² (2)

Q.1.4 Recall that the land uses displayed are lined up on both sides of the Davenport road. How long is this road?
_____kms (2)

- Add both the *Schools* and *Hospitals* layers to the map document.

Q.1.5 How many learners are there in Primary School within 3 km of *Davenport Road*?
_____ (2)

- Label the *Hospitals*.
- Zoom out to an extent that shows both *Davenport Road* and the Durban Harbour. Create a layout that includes the *Schools* and *Hospitals*. Save your layout in a file called *Davenport_Road_Harbour.jpg* at a resolution of 200 dpi then save the map doc. **(10)**

Task 2:

20 marks

You are employed by the NGO “Save the Rhino” and are currently analyzing rhino sightings in the Pilanesberg National Park as part of a project to assess where and when the most significant losses to poaching have occurred. You have the following data:

A layer of the Roads of Pilanesberg

A layer showing the Border of Pilanesberg

A table showing the Rhino Sightings in Pilanesberg from 1998 to 2000 (Table1.dbf)

- Open the map document called Task 2 from your test folder.
- Add the table called *Table1.dbf* from your test folder.
- Display the table called *Table1.dbf* on the map document to show the position of the rhino sightings in Pilanesberg National Park. Set the coordinate system of this layer by importing the information of the *Border* layer in your Task 2 folder.
- Export the data from the displayed *Table1* as a shapefile. Call this file *rhino_sightings.shp* and save it in your *Task 2* folder. Add this shape file to the map document.

- Add the *Roads* layer from your test folder to the map document.

Q.2.1 What the FID number of the point that is out of place when you zoom to the full extent of the map document

_____ (2)

- Symbolize the *Border* of the Pilanesberg National Park so that only the outline of the border is showing as red. Move the *Roads* layer to the bottom of the Table of Contents.

Symbolize the *rhino_sightings* by group size using a graduated symbol.

Q.2.2 How many rhinos were sighted within 100 meters of a road?

_____ (2)

Q.2.3 In how many locations were rhinos sighted after midday (12h00 or 12pm)

_____ (2)

Q.2.4 Use the entire data set and summarize the Group Size Field (Size).

How many rhinos were in the largest group?

_____ (2)

Q.2.5 In how many locations were rhinos seen between (and including) the hours of 0900 (9am) and 1600 (4pm) in 1998?

_____ (2)

- Save your map document **(10)**

Task 3:

20 marks

You are employed by Ethekewini Municipality’s Health Department and are currently evaluating accessibility to health care facilities. You have the following data:

- A layer of the District Councils of KwaZulu Natal
- A layer of the Health Institutions in KwaZulu Natal
- A layer of the Border of Ethekewini Municipality (Durban)
- A layer of the Main Roads that run through South Africa

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- Open the map document called *Task 3* from your test folder.
- Clip the *Main Roads* layer to the Border of Ethekewini Municipality, save the output feature as *Main_Roads_Durban.shp*, and save it to your *Task 3* folder. Add this layer to your map document.
- Symbolise the *Main_Roads_Durban* layer to only show the N3
- Create a 5km buffer around the N2 & N3 in Ethekewini. Specify a dissolve type of All and call it *Highway_buffer.shp*.,and save it to your *Task 3* folder. Add this layer to your map document.

Q. 3.1 How many *Health Institutions* are within this buffer?

_____ (2)

Q.3.2 Of these, how many are Hospitals?

_____ (2)

Q.3.3 How many Clinics fall outside the buffer?

_____ (2)

- In the *District Councils* attribute table, create a new field called Population with a type of Double, a Precision of 18 and a Scale of 0.
- Calculate the Population for each *District Council* by adding the populations for all ethnic groups, including “Other”

Q.3.4 What is the Population of KwaZulu Natal?

_____ (4)

- Save your map document. **(10)**

Task 4:

20 marks

You are currently employed as a GIS consultant by Metro-Rail to analyse the railway infrastructure within the Ethekewini Municipality. You have the following data:

- A layer showing the **Railway Lines** within Durban
- A layer showing the **Railway Stations** within Durban
- A layer of the **Suburbs** of Durban

- Open the map document called *Task 4* located in your test folder
- Change the symbol for the **Railway Line** to RailRoad, width 6
- Add the **Railway Stations** layer to the map document.

Q.4.1 What is the coordinate system of this layer?

_____ (2)

- Define a Geographic coordinate system for this layer using the WGS84 datum.
- Project the **Railway Stations** layer using a New Projected coordinate system. Use the Gauss Kruger projection with a Central Meridian of 31, with Meters as the linear unit and Scale of 1. Save it as **LO31 Haartebeesthoek 94** and set the Geographic Coordinate system as WGS84.

Q.4.2. How many **Suburbs** do the **Railway Lines** run through?

_____ (2)

Q.4.3. What is the total length of **Railway Lines** in the display?

_____ (2)

Q.4.4. What is the straight distance between Emberton Station and Kloof Station

_____ (2)

- Create a table showing the total length of railway lines in the display .

Q.4.5. How many Tunnels are there?

_____ (2)

- Save your map document (10)

Now open Microsoft Word 2010 document and type your Initials and Surname, Student Number and Computer Number at the top of the page. Then copy and paste each of the map documents you created in *Tasks 1 to 4* into this word doc. Then, if you are a HC student email it to Sookrajhro@ukzn.ac.za and 200270416@stu.ukzn.ac.za , or if you are a WVL student email it to watsonh@ukzn.ac.za.