



**NTNU – Trondheim**  
Norwegian University of  
Science and Technology

Department of Geography

## **Examination paper for GEOG2009 - Vector Based GIS**

**Academic contact during examination:**

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**Examination date:**

**22<sup>th</sup> May, 2015**

**Examination time:**

**3 hours**

**Credits:**

**7.5**

**Grades to be announced on:**

**12<sup>th</sup> June, 2015**

**Permitted examination support material:**

**Calculator**

**Other information:**

**The following basic calculators are permitted:**

- Casio fx-82ES PLUS
- Citizen SR-270X and Citizen SR-270X College
- Hewlett Packard HP30S

**Language:**

**English**

**Number of pages:**

**3**

**Number of pages enclosed:**

**0**

**Please respond on all questions.**

**Task 1            15 %**

- a. Although the terms data and information are often used interchangeably, there is a clear distinction between them. What is the difference between data and information?
- b. What kind of systems are NAVSTAR, GLONASS and GALILEO?
- c. Below is a map of airline routes – why are the lines bended?



**Task 2            20%**

GIS simplify a complex world into three basic types of entities (or geometries): point, lines and areas (polygons). Outline some of the problems associated with simplifying the real world into basic, two dimensional entity types.

**Task 3            35 %**

The table below shows a subset of a database on armed conflicts.

<b>ID</b>	<b>BeginYear</b>	<b>EndYear</b>	<b>Country</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Radius (km)</b>
2	1955	1961	Algeria	35,5	3,0	50
33	1979	1988	Afghanistan	35,0	67,0	100
42	1998	1999	Angola	-11,0	16,0	300
365	1972	1975	Oman	18,0	55,0	200
471	1987	1991	Turkey	37,5	43,0	150
7020	1950	1991	Burma	17,0	97,0	50

Each conflict is represented by a row in the table which has several columns, like for instance when the conflict started (BeginYear), when it ended (EndYear), and location (Country), co-ordinates for the conflict's centre (Latitude and Longitude), and a radius value representing the extension of the armed conflict. The entire database includes conflicts from 1946 until 2008. The latitude and longitude field make it possible for you to map the content of the table.

- a) As you see from the table, the conflicts' centrum is represented by latitude and longitude co-ordinates. What co-ordinate system is this? Give a brief description.
- b) Is this a suitable co-ordinate system when you need to calculate distances or areas? If not, how would you need to prepare the data to be more adequate for distance and area measures?

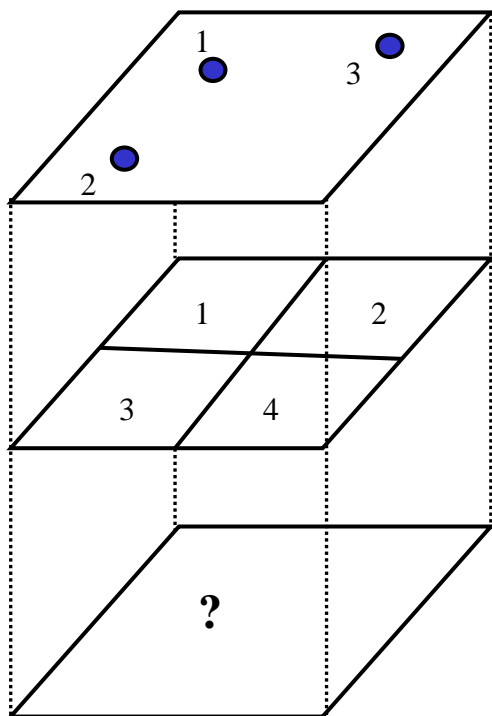
In order to make a map from a subset of the database you may use queries.

- c) Formulate a SQL expression that result in a selection of all conflicts active in 1967.
- d) Formulate a SQL expression that result in a selection of those conflicts that were active at some time during the period from (and inclusive) 1973 to (and inclusive) 1989.

**Task 4      30 %**

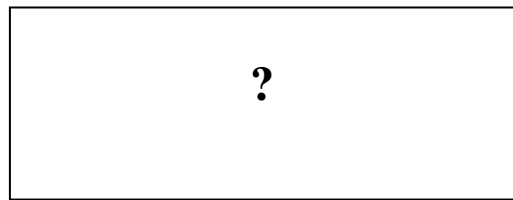
The figure below shows a layer containing points representing the centers of armed conflicts and a layer containing polygons representing countries. A point-in-polygon overlay will be performed on these two layers. The result of such a point-in-polygon overlay is a new layer.

- a. Which type of geometry (point, line, or polygon) will the new layer contain?
- b. Below, a part of the point-in-polygon overlay is outlined. The attribute table corresponding to the center points for the conflicts has two columns: ID number and level of seriousness given by an intensity value. The attribute table corresponding to the countries has also two columns: ID number and level of gross national product (GDP). Show the result of this point-in-polygon overlay (draw the new resulting layer and the content of the corresponding attribute table).



ID#	Intensity
1	3
2	1
3	2

ID#	GDP
1	Poor
2	Moderate
3	Poor
4	Rich



- c. Write a SQL expression that selects all rows from the resulting attribute table (from task b above) that represent conflicts with intensity = 3 and which is inside the borders of a country having a GDP level that equals "Poor".