Tentti / Exam 8.12.2022

GIS-E1070 Theories and Techniques in GIS D

Answer to **three** questions. Each question is worth a maximum of 10 points.

Your submission to each question should be an essay. In each essay remember to explicitly describe all relevant aspects of the topic or topics related to the question. Focus on aspects mentioned in the grading outline for the question and remember to write **an essay** for each answer. Other types of answers, such as bullet point lists, will be given **significantly** reduced points.

All publicly available sources are acceptable. Please remember that plagiarism is, however, **not** acceptable. Short direct quotes (e.g. for definitions) are permitted and should be clearly marked as such in the text. If you use sources other than lecture slides or literature mentioned in the slides, please include a list of references. You do **not** need to include citations in the text, but the list of references is required.

This is individual work. Plagiarism includes cooperation with other students.

You can write your answers in Finnish, Swedish, or English.

1.

What is the difference between the point in polygon and the point location –problems. Describe how both problems are solved on a computer. Compare and contrast the methods for solving these problems.

Grading:

Explanation of the basic concept point-in-polygon and point location problems (2p)
Describing the differences between the problems (2p)
Describing how both problems are solved on a computer (4p)
Comparison of the computational problem solving methods (2p)

2.

Design a method for calculating the fastest path on a raster cost surface. Describe your method and justify your design decisions. In the cost surface the value of the pixel represents the amount of time required to cross the pixel horizontally or vertically. NoData pixels cannot be crossed at all.

Overview of the method (3p)
Detailed description of the model and algorithms used (3p)
Justifications for the design decisions (4p)

3.

What are local, focal, and zonal operations in map algebra? Explain all three operation types, and how they differ from each other. Give examples of a real-world problem that can be calculated using each operation type and explain how the problem can be solved using map algebra. Also describe what input data is required, and how the output represents the solution

Explanation of *local*, *focal*, and *zonal* map algebra (3p)
Appropriate explanation of the differences between the three (2p)
Explanation of a real-world problem that can be calculated using each of operation type (3p)
Appropriate inputs described (2p)

4.

Create an object model that can be used to create geospatial models of city parks. Describe your model, justify your design decisions and connect them to the appropriate theory.

Grading:

Descriptions of the model (3p)
Proper justification for the design decisions made (4p)
Use of proper theory in the answer (3p)

5.

Describe what it means for an element in an Object model to be *identifiable, relevant,* and *describable*. Explain how elements in a vector data model representing buildings are *identifiable*, *relevant*, and *describable*. Remember to also describe what kind of model you're using to represent buildings at sufficient detail.

Description of what it means that a data element is *identifiable* (2p)
Description of what it means that a data element is *relevant* (2p)
Description of what it means that a data element is *describable* (2p)
Proper explanation on how to apply this in the example (4p)