CANADIAN BOARD OF EXAMINERS FOR PROFESSIONAL SURVEYORS

E1 - SPATIAL DATABASES & LAND INFORMATION SYSTEMS March 2014

Note: This examination consists of 10 questions on 3 pages. **Marks**

Q. No Time: 3 hours Value Earned

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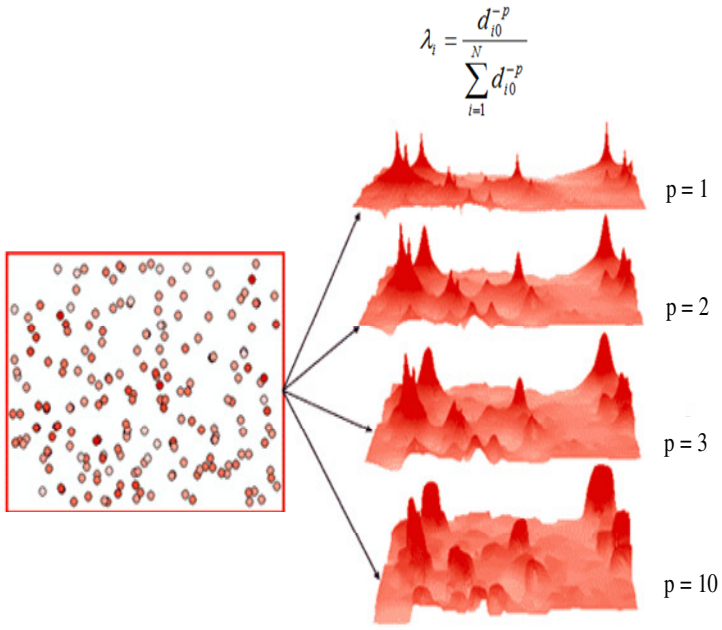
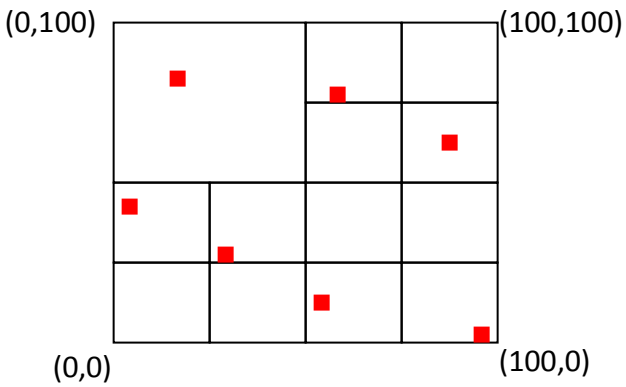
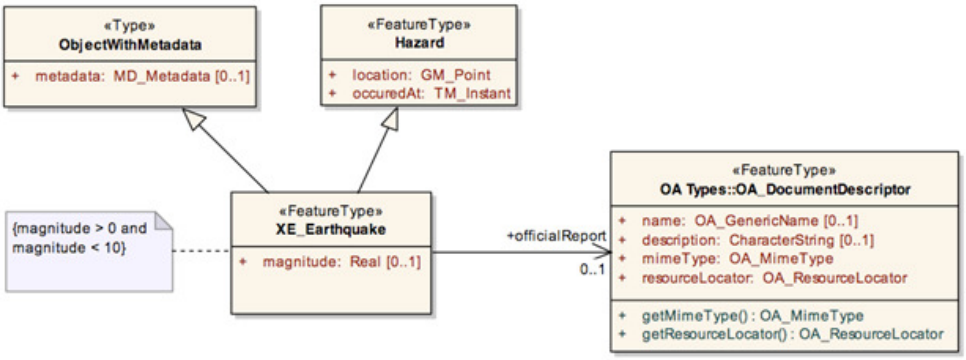
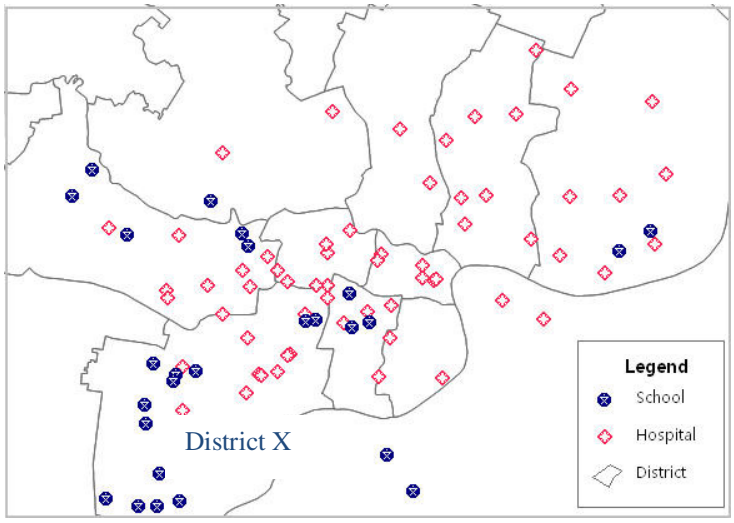
1.	How is a spatial database different from a Land Information System? Give three functionalities of a spatial database and three functionalities of a Land Information System.	10	
2.	Which statement is TRUE? Please explain why. a) Spatial indexes are used in spatial databases to get fast access to the objects in a particular area of a map. b) Spatial indexes are not useful in searching for potentially overlapping or intersecting objects. c) R-tree indexing is more appropriate than Quadtree indexing for searching point objects in a spatial database.	5	
3.	Select the correct answers to the following questions: a. How is the HAVING clause used? ☐ The HAVING clause specifies a search condition for an aggregate or a group of attributes. ☐ The HAVING clause is used to select distinct values of a column. ☐ The HAVING clause is used to join 2 or more tables. b. The SQL BETWEEN operator … ☐ specifies a range of values. ☐ specifies which tables we are selecting from . ☐ specifies that a column is a primary key. c. Which of the following SQL statements selects the total number of parcels from the owner table below? ParcelNumber | Date | OwnerID 1 | 12/12/2010 | 13 2 | 13/12/1999 | 17 3 | 27/05/1930 | 21 ☐ SELECT SUM (ParcelNumber) FROM Owner. ☐ SELECT AVG (ParcelNumber) FROM Owner . ☐ SELECT COUNT(*) FROM Owner. d. What follows after the SQL WHERE clause? ☐ Definition of the condition to be met for the rows to be returned. ☐ A list of columns to be selected. ☐ The name of the table we are selecting from.	2.5 2.5 2.5 2.5	

4.	Based on the point distribution of mineral concentrations found in cultivars of potatoes shown below, four interpolation surfaces using the Inverse Distance Weighting (IDW) method were calculated with different values for the power parameter (p) which define the rate of reduction of the weights as distances increases (also known as the exponent value).  a. What value of p is more appropriate for this interpolation? ☐ 1 ☐ 2 ☐ 3 ☐ 10 b. What value of p has produced the "bull's-eye" effect? ☐ 1 ☐ 2 ☐ 3 ☐ 10 c. What happens when p is set to 0?	5 5 5	
5.	Draw the Quadtree tree for the point data below.  	5	
6.	No matter how inexpensive and wide-spread GPS technology becomes, why will it not entirely solve the problem of creating precise and accurate datasets for land information systems?	10	

7.	List five methods of spatial data acquisition for a spatial database. How might you describe some of the challenges of acquiring spatial data?	10	
8.	Disasters and emergencies involve serious disruption of the functioning of society. Coping with an emergency involves the coordination of information and services about what is happened and is expected to happen to whom, what can be done and Who can take action with What resources. Consider the UML Class Diagram below. This model represents the features needed to support interfaces and services for emergency management functions in a land information system. Please answer the following questions regarding this model. a. Can the same instance of the Hazard feature class have multiple locations? If not, what do you need to do to allow this? b. If we delete one instance from the database of the XE Earthquake feature class what happens to the metadata linked to that instance? c. Which are the features below that have class behaviour? 	5 5 5	
9.	Suppose you found some old aerial photos of your town and you wanted to georeference them. Taking into account the georeferencing process in a land information system, how would you georeference a scanned aerial photo?	10	
10.	This is a district map portraying the spatial distribution of schools and hospitals.  Write down the spatial SQL statement to query all the hospitals that are within 300 meters from schools in the district X.	10	
	Total Marks:	100	