

National Exams December 2008

04-Geom-A7, Geospatial Information Systems

3 hours duration

NOTES:

1. If doubt exists as to the interpretation of any question, the candidate is urged to submit with the answer paper, a clear statement of any assumptions made.
2. This is an OPEN BOOK EXAM.
Any non-communicating calculator is permitted.
3. Twelve (12) questions constitute a complete exam paper.
All twelve questions as they appear in the answer book will be marked.
4. Each question is of varying value.
5. Most questions require an answer in essay format. Clarity and organization of the answer are important.

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Geospatial Information Systems
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Marks

- 10 1. List five data sources that can be used in computer-based geospatial information systems (GISs)? (5 x 2 marks)
- 10 2. Define the following in the context of GIS: (5 x 2 marks)
- a. lineage,
 - b. viewshed,
 - c. precision,
 - d. accuracy,
 - e. tessellation.
- 5 3. Describe how georeferencing is achieved in a geospatial information system. (5 marks)
- 12 4. What are the relative advantages of using vector-based versus raster-based data structures for geospatial information systems in terms of: (6 x 2 marks)
- a. data storage,
 - b. point precision,
 - c. feature representation,
 - d. feature searching,
 - e. change detection,
 - f. using satellite digital image data.
- 5 5. What type of 2-D coordinate transformation should be used when four control points are digitized on a map sheet? Explain your choice. (5 marks)
- 10 6. During the process of merging several data sets into a GIS it is determined that there are residual geometric distortions. Detail the procedure you would use to deal with (i.e., eliminate and/or minimize) these differences.
- 8 7. When would you use the following for representing geospatial data locations:
- a. 3-D Cartesian coordinates (e.g., E, N, h)?
 - b. 3-D Geodetic coordinates (e.g., ϕ , λ , h)? (2 x 4 marks)
- 5 8. What are the factors that should be considered when choosing a map projection for displaying GIS data?
- 10 9. In the context of a GIS: (2 x 5 marks)
- a. How does Delaunay triangulation relate to the formation of a TIN?
 - b. How is object-oriented modeling used in GIS?
- 5 10. What is the difference between spatial (i.e., geometric) and attribute uncertainty?
- 10 11. In terms of data quality management, explain: (2 x 5 marks)
- a. How data uncertainty is represented in a GIS?
 - b. How and why lineage is important for tracking data history in a GIS?
- 10 12. How would you use a GIS to: (2 x 5 marks)
- a. select a location for a pharmacy?
 - b. determine the catchment region of a watershed?

Marking Scheme

1. 10 marks total (5 items times 2 marks each)
 2. 10 marks total (5 items times 2 marks each)
 3. 5 marks total (5 marks for descriptors)
 4. 12 marks total (6 items times 2 marks each)
 5. 5 marks total (5 marks for descriptors)
 6. 10 marks total (10 marks for descriptors)
 7. 8 marks total (2 items times 4 marks each)
 8. 5 marks total (5 marks for descriptors)
 9. 10 marks total (2 items times 5 marks each)
 10. 5 marks total (5 marks for descriptors)
 11. 10 marks total (2 items times 5 marks each)
 12. 10 marks total (2 items times 5 marks each)
- 100 Marks Total