8/1/2019

14.00 - 16.00pm

KE G43, Kevin Street

DUBLIN INSTITUTE OF TECHNOLOGY

DT249/DT249P BSc. (Honours) Degree in Information Systems / Information Technology (Part-time)

DT255 BSc. (Honours) Degree in Information Systems / Information Technology (Full-time)

Stage 4

WINTER EXAMINATIONS 2018/2019

GEOGRAPHIC INFORMATION SYSTEMS [CMPU4032]

MR. MARK FOLEY
DR. DEIRDRE LILLIS
PROFESSOR ELENI MANGINA

TUESDAY 8TH JANUARY 2.00 P.M. – 4.00 P.M.

TWO HOURS

ANSWER ***THREE*** QUESTIONS.
ALL QUESTIONS CARRY EQUAL MARKS.
ONE COMPLIMENTARY MARK SHALL BE AWARDED FOR A MAXIMUM OF 100.

1. (a) What do you understand by the terms raster and vector? How would you decide which to use in any given project?

(6 marks)

(b) Distinguish between nominal, ordinal, interval, ratio and cyclic data types.

(6 marks)

(c) Explain the importance of *topology* in GIS.

(7 marks)

(d) What are the main advantages and disadvantages of using *shapefiles* to represent geographic data?

(7 marks)

(e) What is a *triangulated irregular network* (TIN)? Where would this be used?

(7 marks)

2. (a) Explain the notion of *Spatial Interpolation*. Discuss *Inverse Distance Weighting* (IDW) as a method of spatial interpolation. Your answer should highlight the pros and cons of this method.

(8 marks)

(b) Describe the usefulness of *slope* and *aspect* measures from a *Digital Elevation Model* (DEM). How are these calculated?

(8 marks)

(c) What is meant by *Viewshed Analysis*? Under what circumstances would this be useful? How is it calculated?

(7 marks)

(d) Briefly describe the following types of spatial analysis:

(i) Queries and reasoning
(ii) Measurements
(iii) Transformations
(iv) Descriptive summaries
(v) Optimization techniques

(10 marks)

3. (a) Briefly describe the *Douglas-Peucker* Algorithm for line simplification.

(9 marks)

(b) When considering the problems of error in digitization, what is meant by

(i) Edge matching

(ii) Rubber sheeting

(8 marks)

(c) What are the main sources and types of error that might be introduced during digitization? Give examples.

(8 marks)

(d) How would you check *attribute* data?

(8 marks)

4. (a) Describe a *point-in-polygon* overlay operation.

(5 marks)

(b) A *line-in-polygon* operation produces a line layer, which typically has more records (features) than the input line layer. Why?

(5 marks)

(c) Define slivers from an overlay operation.

(5 marks)

(d) Describe a scenario in which *intersect* is preferrred over *union* for an overlay operation.

(9 marks)

(e) Suppose the input layer shows a county and the overlay shows a forest. Part of the county overlaps the forest. We can express the output of an *intersect* operation as `[county] AND [forest]`. How can you expres the outputs of a *union* operation and an *identity* operation?

(9 marks)