W211/403C, W228/403C, W249/403C, W249P/403C

DUBLIN INSTITUTE OF TECHNOLOGY

DT211C/4 BSc. (Honours) Degree in Computer Science (Infrastructure)

DT228/4 BSc. (Honours) Degree in Computer Science

DT249/4 BSc. (Honours) Degree in Information Systems / Information Technology (Part-time)

DT249P/1 School of Computing (CPD)

WINTER EXAMINATIONS 2016/2017

GEOGRAPHIC INFORMATION SYSTEMS [CMPU4032]

MR. MARK FOLEY

WEDNESDAY 4TH JANUARY 9.30 A.M. – 11.30 A.M.

TWO HOURS

ANSWER **THREE** QUESTIONS.

ALL QUESTIONS CARRY EQUAL MARKS.

1. (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)

2. (a) What is meant by "Map Overlay"? Compare and contrast vector and raster methods of map overlay. Is either method "better" than the other?

(12 marks)

(b) In general terms, describe how one would go about writing a solution for a Point-in-Polygon query.

(7 marks)

(c) Describe how new attribute data is created as a result of vector overlay.

(7 marks)

(d) What is meant by "Map Algebra"? Give examples of its use.

(7 marks)

3. (a) What are the desirable properties of a georeference?

(9 marks)

(b) What are the practical problems associated with the use of latitude and longitude as a global georeference?

(6 marks)

(c) What are the deficiencies of postal addresses when they are used as georeferences?

(6 marks)

(d) Summarize the arguments for and against use of a single ellipsoid such as WGS84.

(6 marks)

(e) Describe in general terms the common types of map projections. Comment on their uses and limitations.

(6 marks)

4. (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)