GEO1015.2025 – Midterm Quiz (version A)

2025–12–10

Name: _____

Student ID: _____

This mid-term quiz is worth 10% of the final mark for the course

All questions have an equal weight: 1 point

Answer directly on these pages

There is only one good answer for multiple choice questions

This is an open-book exam, only paper and a calculator is allowed

This midterm quiz has 10 questions.

You have **45min** to do this quiz.

1. You have 2 gridded datasets for an area, and for one xy-location both values for the DSM and the nDSM are exactly the same. Where is this dataset most likely from?

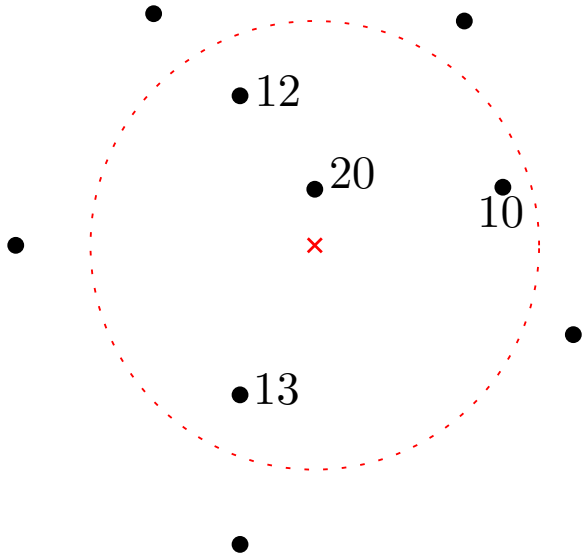
   - ◯ Delft, the Netherlands
   - ◯ Mount Everest, Nepal
   - ◯ Zürich, Switzerland
   - ◯ it's impossible to have the same value for a DSM and a nDSM

2. A Delaunay triangulation (DT) has 79 (finite) vertices and 151 (finite) triangles. How many infinite triangles are in the data structure held by `startinpy` (knowing it uses one infinity vertex, and not a big triangle).

   - ◯ 3
   - ◯ 5
   - ◯ 7
   - ◯ 72
   - ◯ none of these

3. You perform twice the standard IDW interpolation at the location of the red cross, for both you keep the same radius (shown in red). Which power will yield a higher estimated value?

   ◯ power=1.5
   ◯ power=2.0



4. You create the TIN of a part of the AHN5 dataset representing BK-City. If this dataset has $1\,915\,401$ points, how many vertices will be in the TIN? And why, explain very briefly.

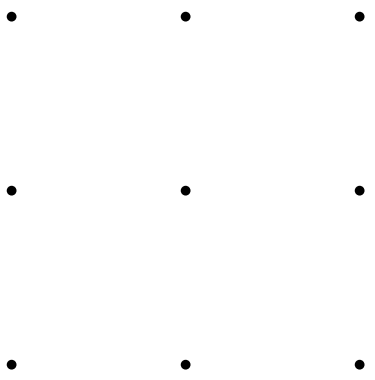
   ◯ less than $1\,915\,401$, because _____
   ◯ exactly $1\,915\,401$, because _____
   ◯ more than $1\,915\,401$, because _____

5. Where are you more likely to have many GEDI measurements for a given area?

   ◯ Tromsø (Norway)
   ◯ Kuala Lumpur (Malaysia)

6. Write down 2 reasons why the *deletion* of a vertex in a DT is useful for modelling terrains.

7. Draw both the Voronoi diagram and the Delaunay triangulation for the following 9 points representing the centres of a 3x3 grid: *[ideally use 2 different colours]*



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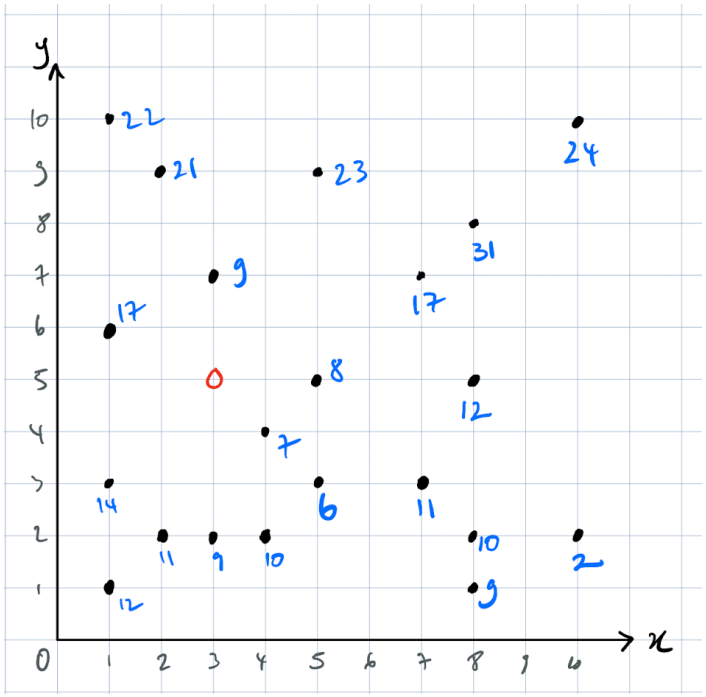
8. Perform an IDW interpolation at the location $(3, 5)$ (red circle) with power=2 and radius=2.5. Include your development to get to the answer, and you can draw on the image below.



9. Calculate the aspect for the following triangle in a TIN, it has 3 vertices:
   - $\boldsymbol{a}$ $(10, 12, 4)$
   - $\boldsymbol{b}$ $(20, 15, 7)$
   - $\boldsymbol{c}$ $(14, 22, 13)$

10. You have a (Delaunay) TIN stored in `startinpy`. Describe an algorithm/method to calculate the area of the Voronoi cell of a given vertex v (the vertex is not on the boundary of the convex hull). *[You can describe the general idea and draw a sketch, no need to know the exact functions]*