

Name: _____

Student ID: _____

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

All questions have 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 is allowed. No computer/phone/etc; a calculator is fine.

The total number of questions is 10.

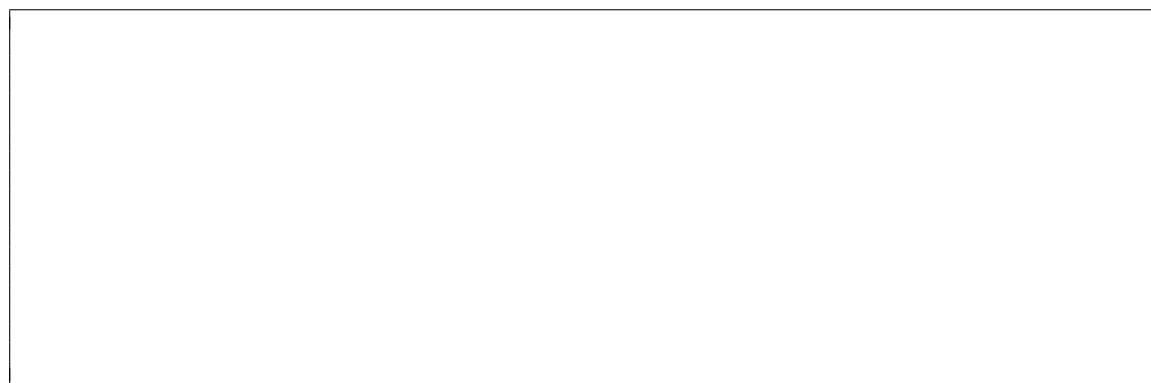
You have 40min to do this quiz.

- (1 point) From the AHN4 dataset, we know that at location (x, y) the DSM elevation is 12m (EPSG:7415), and that the nDSM is 13m. What is the elevation of the terrain/ground?
 - 1m
 - 0m
 - 1m
 - none of these
- (1 point) You have 572 elevation points (x, y, z) and you want to create a gridded DTM (with a resolution of 1mX1m) from the region covering those points (which is 50mx50m). At how many places will you have to interpolate?
 - 572
 - 1144
 - 2401
 - none of these
- (1 point) Given a Delaunay vertex v in a Delaunay triangulation, its dual is:
 - a Voronoi edge incident to v
 - a Voronoi edge perpendicular to v
 - a Voronoi polygon formed by the union of all the triangles incident to v
 - none of these
- (1 point) In the options of the program `gdalwarp` (which you had to use for hw02) there is `"-r resampling_method"` (see below). Explain why resampling is necessary for `gdalwarp`

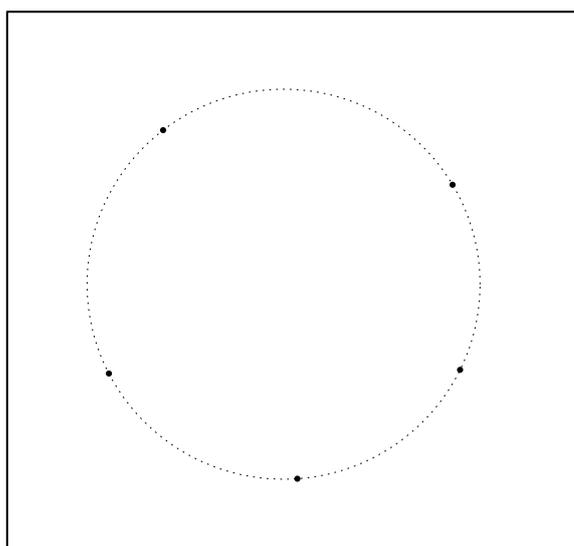
(the default was used when you used it)

```
gdalwarp --help
Usage: gdalwarp [--help-general] [--formats]
  [-b|-srcband n]* [-dstband n]*
  [-s_srs srs_def] [-t_srs srs_def] [-ct string]
  [-to "NAME=VALUE"* [-vshift | -novshift]
  [[-s_coord_epoch epoch] | [-t_coord_epoch epoch]]
  [-order n | -tps | -rpc | -geoloc] [-et err_threshold]
  [-refine_gcps tolerance [minimum_gcps]]
  [-te xmin ymin xmax ymax] [-te_srs srs_def]
  [-tr xres yres][|-tr square] [-tap] [-ts width height]
  [-ovr level|AUTO|AUTO-n|NONE] [-wo "NAME=VALUE"] [-ot Byte/Int16/...] [-wt Byte/Int16]
  [-srcnodata "value [value..]" [-dstnodata "value [value..]"
  [-srcalpha nosrcalpha] [-dstalpha]
  [-r resampling_method] [-wm memory_in_mb] [-multi] [-q]
  [-cutline datasource] [-cl layer] [-cwhere expression]
  [-csql statement] [-cblend dist_in_pixels] [-crop_to_outline]
  [-if format]* [-of format] [-co "NAME=VALUE"* [-overwrite]
  [-nomd] [-cvmd meta_conflict_value] [-setci] [-oo NAME=VALUE]*
  [-doo NAME=VALUE]*
  srcfile* dstfile

Available resampling methods:
near (default), bilinear, cubic, cubicspline, lanczos, average, rms,
mode, max, min, med, Q1, Q3, sum.
```



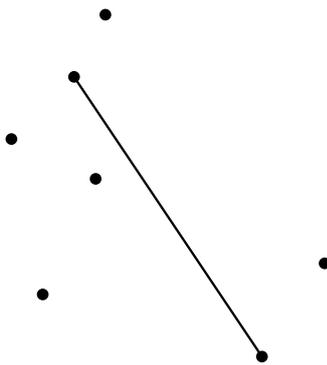
5. (1 point) Draw the Voronoi diagram (VD) and the Delaunay triangulation (DT) for those 5 cocircular points (please use different colours; an approximation is fine; the rectangle is to bound the VD)



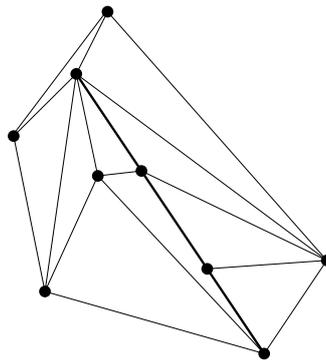
6. (1 point) You interpolate with IDW (radius=10m; power=2.0) and at one given location there are no sample point inside your search radius. Enlarging the radius would make the whole interpolation worse elsewhere. Describe how can you modify slightly IDW to fix this.

7. (1 point) Is the triangulation on the right a valid constrained Delaunay triangulation of the input on the left?

- yes
- no



input

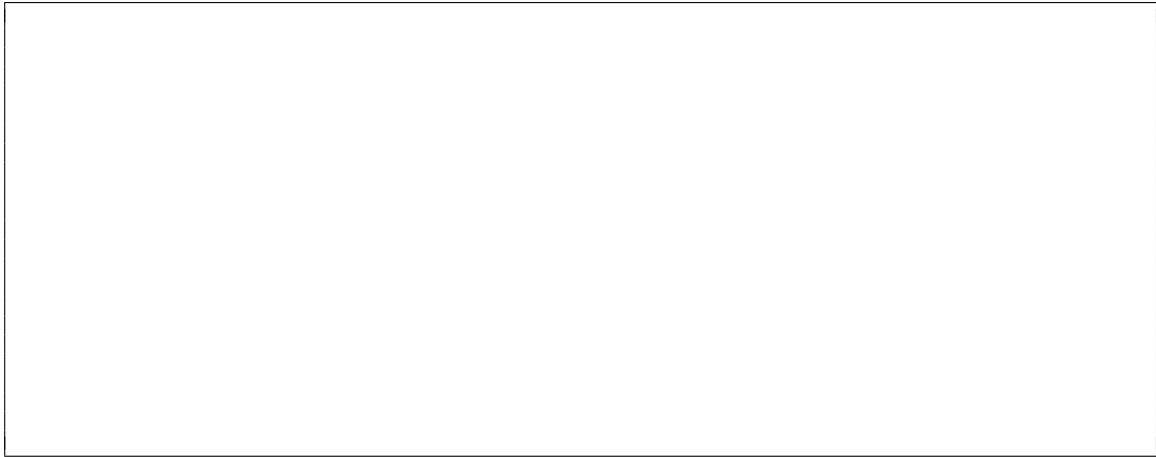


constrained Delaunay triangulation

8. (1 point) [What is the missing word?] A _____ is the word used in the runoff community to describe a pit.

9. (1 point) During the hw02, you typed the following to convert the CopernicusDEM to the Dutch CRS. Explain what the "+" (plus sign) in "EPSG:4326+3855" means and why you had to use it.

```
gdalwarp input.tif output.tif -s_srs EPSG:4326+3855 -t_srs EPSG:7415
```



10. (1 point) Runoff modelling. Draw the accumulation flow for this 3x3 example, knowing that each cell gets 1 unit of rain (draw directly on the gridded terrain)

3	8	9
15	16	12
17	21	15