

Geol 588

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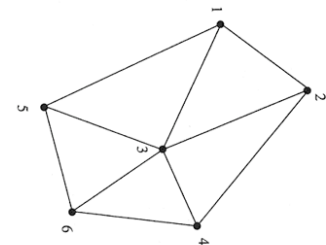
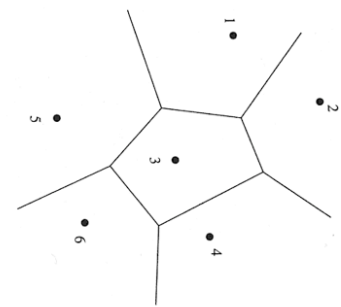
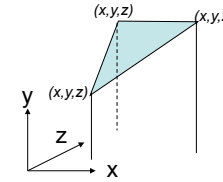
GIS for Geoscientists II

TIN

1

TIN - triangulated irregular network

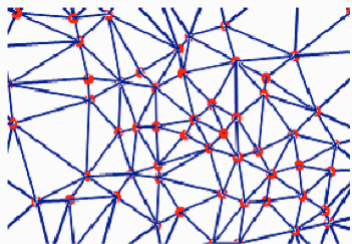
- Made via **direct** connection of 2D points (features)
- No prior interpolation needed
- points also carry elevation (z) values
- Delaunay triangulation:
 - creates a Triangle Irregular Network
 - optimal triangle shape, uses closest points
 - avoids very thin (“skinny”) triangles
- ArcGIS: TIN and Terrain format



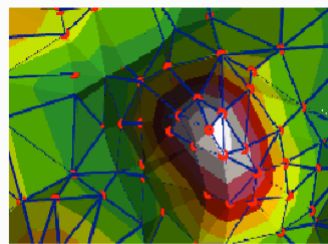
2

Edges: Blue

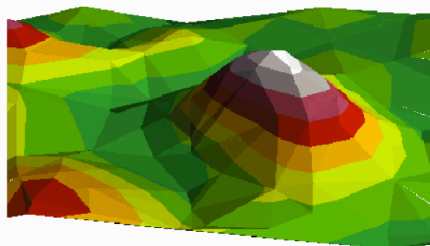
Node (vertex) : Red



Nodes and edges of a TIN



Nodes, edges, and faces



TIN in perspective view

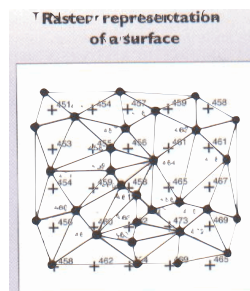
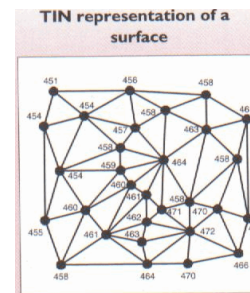
Triangle “interior” colored by elevation

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TIN vs raster for an elevation surface

TIN:

- start with points with x/y/z coordinates
- connect points to a mesh (network)
- implies linear interpolation by directly connecting points to triangles
- usually not a rectangle but a wrapper around points (“convex hull”)
- can internally incorporate line features (break lines)



Raster:

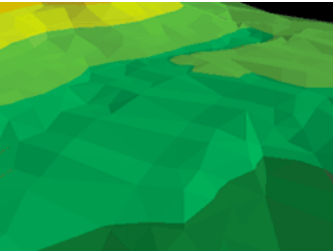
- Always a rectangle filled with cells
- cells contain z value (but no explicit x/y coordinates)
- z values were typically interpolated from elevation points

ArcGIS can convert between both

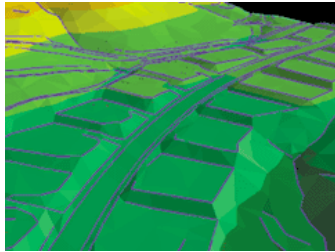
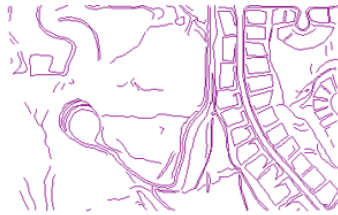
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TINs can incorporate lines:

TIN from masspoints only

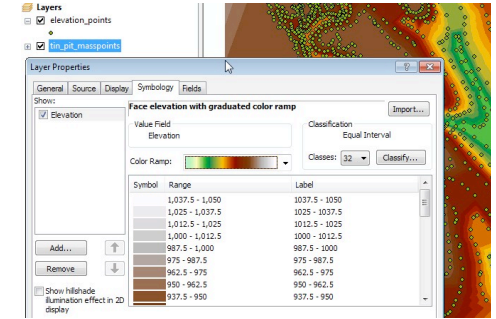
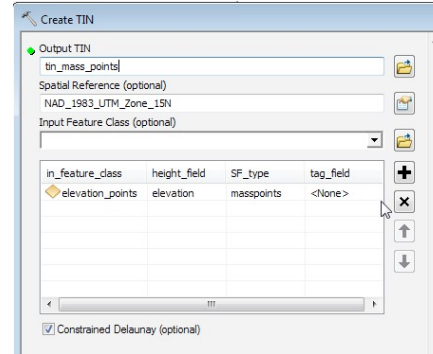


after adding hard lines (lines have elevation!)



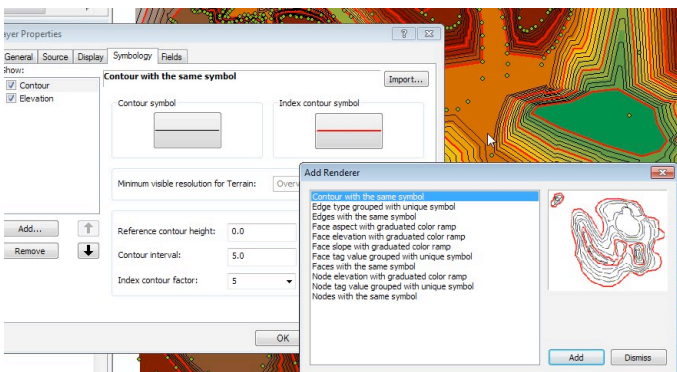
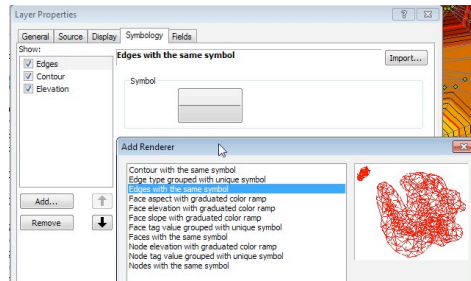
TIN exercise

- data is in data/tin_exercise (warning: these points are former contours ...)
- Remember to activate 3D analyst extension and toolbar
- Tools: 3D Analyst Tools - ...
- Create TIN from elevation_points features (Delaunay triangulation)
- Use **Create TIN** Tool:
 - Output name: tin_pit - cannot be put inside a GeoDB (only terrains can)
 - Spatial Reference: same as elevation_points
 - height field: elevation (attribute)
 - tag field - None

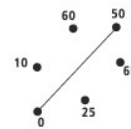


Symbolize with:

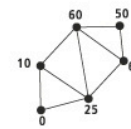
- 32 colors - Equal Interval
- Add Renders ("layers")
- 5.0 m contours (black), every 5.0 contour as index (red)
- Edges (grey) to



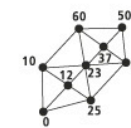
The input data to build a TIN includes four points and one line with two nodes.



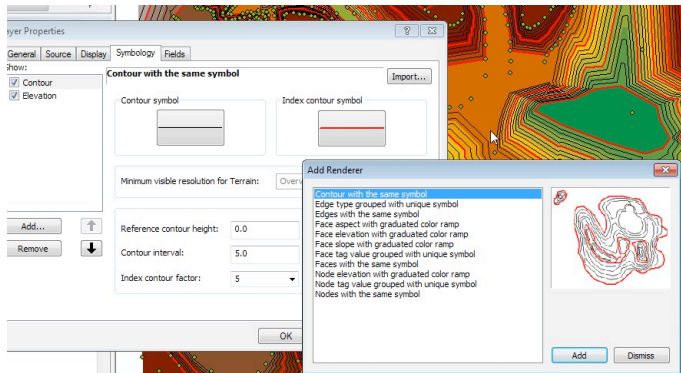
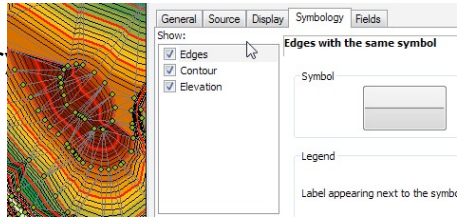
The TIN that results when the points and nodes are processed as mass points.



When the line is enforced as a breakline, the line is maintained in the TIN. Note the z-values of the introduced nodes.

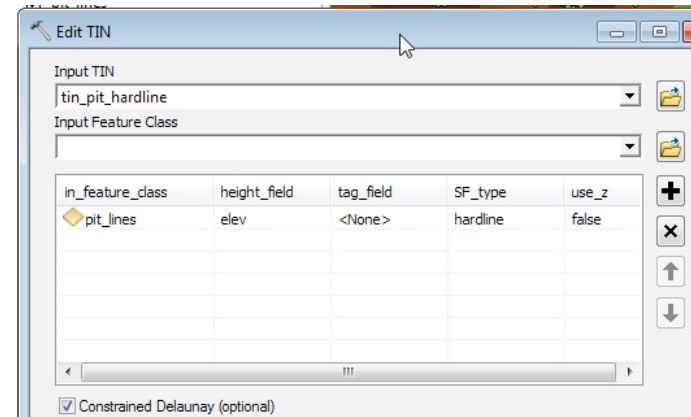


- Symbolize TIN:
 - Add Render (“layer”)
 - 0.5 m contours (black) - every 10. contour as index (red)
 - Edges with same symbol (vertex connections) - Grey



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- Copy TIN tool - name it tin_pit_hardline (notice version)
- “Upgrade” copied TIN with new lines (mining pit plan)
- Edit Tin Tool - add the pit_lines
- use SF_type hardline !
- β



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- optional:
 - subtract Tin_pit_hardline from first TIN
 - visualize in ArcScene
- HW 6:
 - copy data\HW6 - TIN ex
 - instruction (pdf) inside
 - ESRI 3D analyst tutorial exercise 4
 - full 3D analyst tutorial (large!) in data folder

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