TIN - triangulated irregular network

- Made via **direct** connection of 2D points (features)
- No prior interpolation needed
- Points also carry elevation (z) values

**Delaunay triangulation:**
- Optimal triangle shape, uses closest points
- Avoids very thin ("skinny") triangles
Edge: Blue  Node (vertex): Red

Nodes and edges of a TIN  Nodes, edges, and faces

TIN in perspective view
TIN vs raster for a elevation surface

TIN:
• start with x/y/ coordinates and z values (raw points)
• 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 (constant cell size)
• cells contain z value (but no explicit x/y coordinates)
• some (most) z values are interpolated from “raw” points
TIN exercise

- data is in data/tin_exercise
- Remember to activate 3D analyst extension and tool
- Create TIN from features (Delaunay triangulation)
- ArcMap GUI: 3D analyst - Create/Modify TIN (tin_raw)
- need point features (raw.shp) with a elevation attribute (elev)
- Tag: store the elevation values inside each point in the TIN
- Layer Prop. - Symbology: graduated color (10 m intervals)
- Add: more face (triangle), edge and Node (point) visualizations
• Bring tin_raw into ArcScene (add 3D analyst tool)
• Vertical exaggeration: 5 - 10, no smooth rendering
• Add Face elevation with grad. color ramp, color in 10m
• look at pit lines - how many lines, which elevation?
• Modify existing TIN: GIU: add Feature to TIN or ArcTools - Edit TIN
• Add pit lines (elev) with a) mass points, b) soft braek line (tin_pit_mp, tin_pit_sl)
• view in ArcScene, what’s the difference?
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.

- hard vs. soft break line?
- How could we make this TIN a rectangle?
• get difference between tin_raw and tin_pit_sl (volume of the pit)

• convert both to raster, subtract (pit_vol)

• drape pit_vol over tin_raw in ArcScene

• ArcMap GUI buttons (3D analyst tutorial p.40 -)
  • create a contour
  • create line of sight
  • create profile graph - press after you made a line via line of sight or via interpolate line to get graph of the profile
• How many nodes and triangles does tin_raw have?

• simplify the TIN: 3D analyst tools - TIN Surface - Decimate
  (a) z tolerance 0.1 (b) 5000 triangles