

Geol 588

-

GIS for Geoscientists II

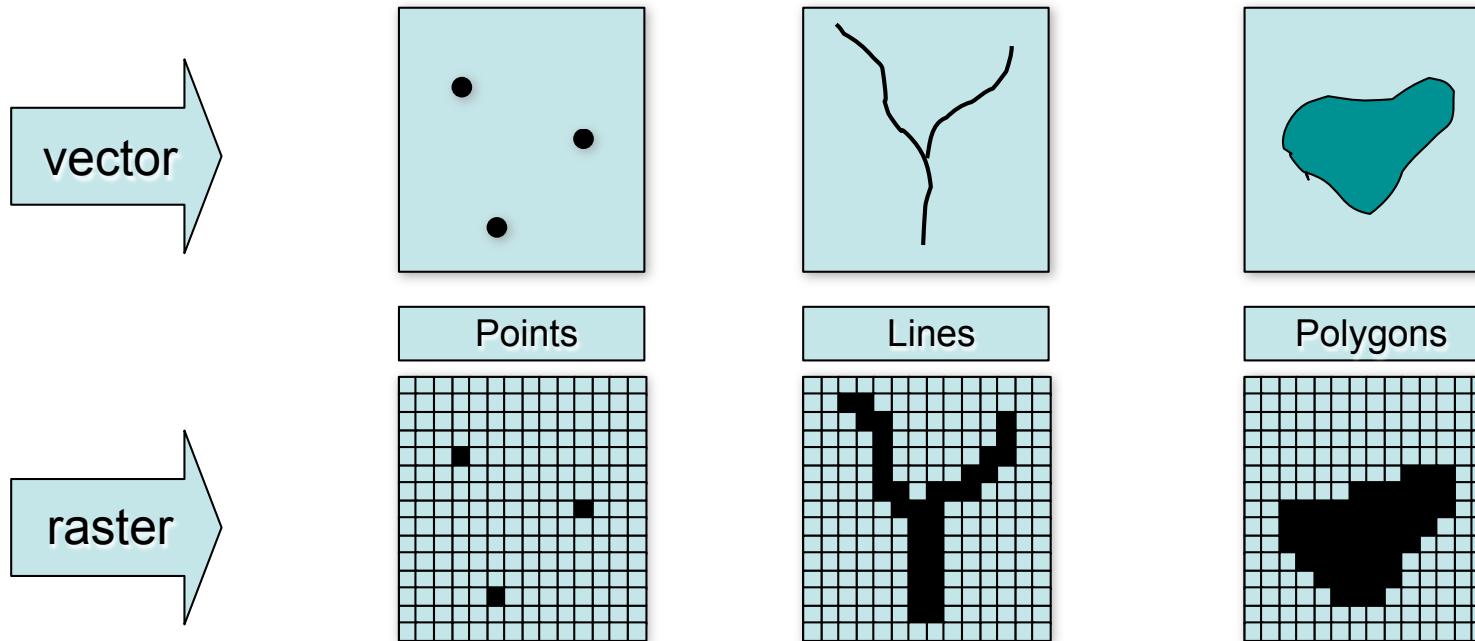
Today

- Some more raster concepts
- Image/Raster manipulation via Python (experimental)
- Start working on HW 1 (WebCT, due next Tuesday)
- MGIS Chapter 15 worked OK?

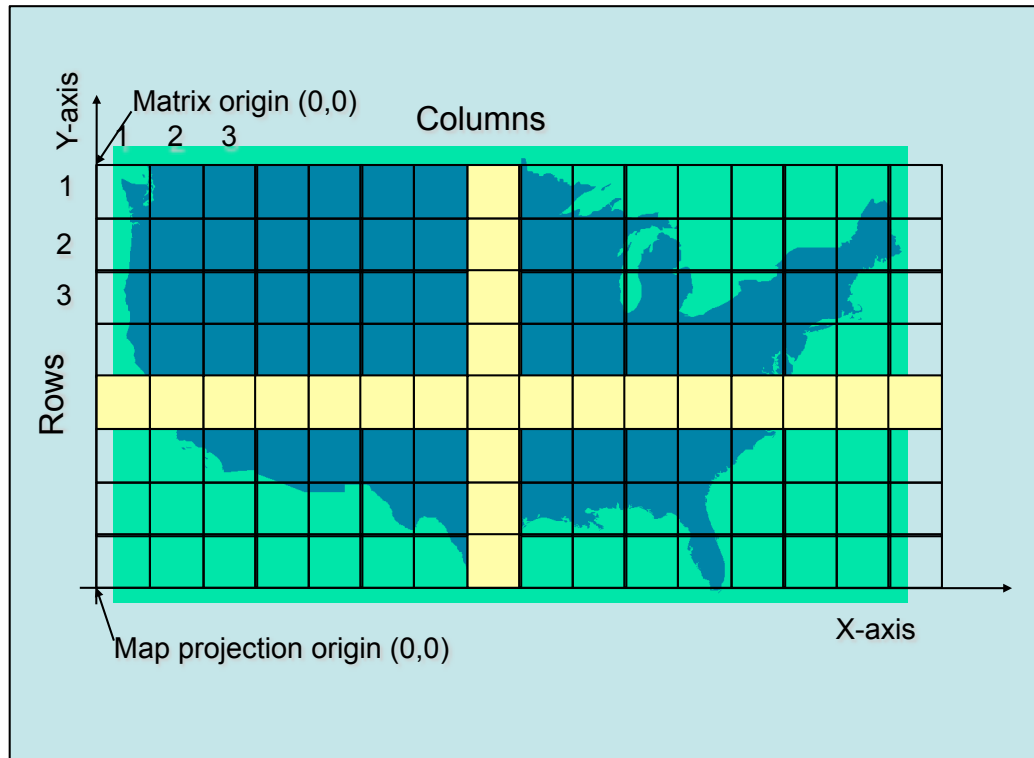
Features as raster

❑ Features lose uniqueness with raster representation

(a line becomes a collection of cells, not one feature)



Raster coordinate systems



Matrix

- Cells located by row/ column position
- Origin at upper-left
- Rows and columns always perpendicular

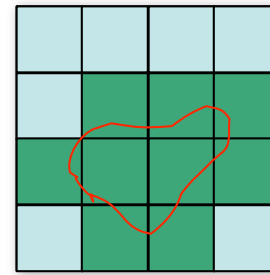
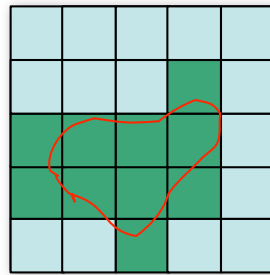
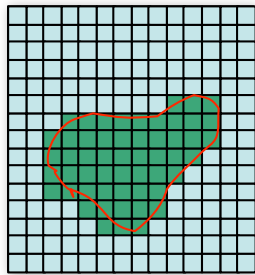
Cartesian

- Cells located by x,y
- May register to a map projection
- Used in ArcMap

Raster resolution

❑ Rasters always generalize spatial data

- A function of cell size (smaller cells = higher resolution)
- Impacts accuracy, processing speed, storage space



Cell size 100m

200m

400m

Matrix 16 x 16

5 x 5

4 x 4

Lake Cells 68

10

9

Raster cell values

- ❑ Raster cell values
- ❑ Integer or floating point — depends on raster format
 - ESRI grid, TIF, 1MG, and
 - ER Mapper support both
 - See help for details
- ❑ Integer: Discrete data
(like land use and vegetation)
- ❑ Floating point: Continuous data
(like distance and rainfall)
- ❑ NoData: Special flag value
 - Indicates no measurement for a cell
 - Numeric value varies with format

Integer

| | | | |
|---------|---|---|---|
| 0 | 1 | 1 | 2 |
| No data | 1 | 1 | 1 |
| no data | 1 | 2 | 2 |
| 1 | 1 | 2 | 2 |

Vegetation
0 = Rock
1 = Forest
2 = Water

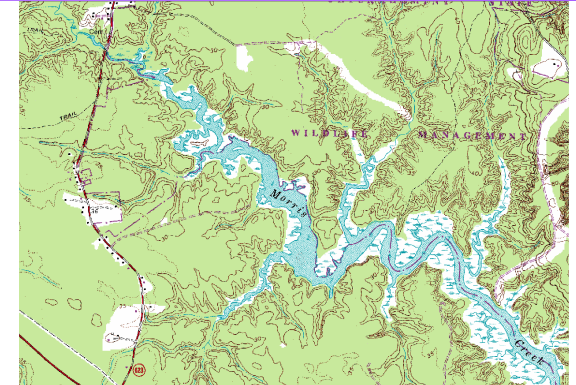
Floating

| | | | |
|-------|------|---------|---------|
| 1.12 | 1.75 | 1.81 | 2.03 |
| 0.26 | 1.63 | 1.87 | 1.98 |
| 0.00 | 0.91 | 0.73 | 1.98 |
| 10.00 | 0.18 | no data | no data |

Rainfall
(inches)

Raster attribute tables

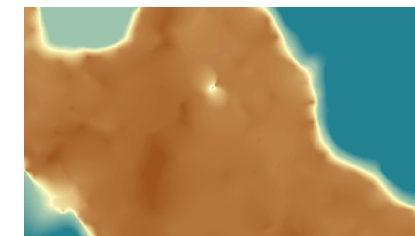
- ❑ All single-band, integer rasters have “virtual” tables
- ❑ Created on-the-fly by ArcGIS
- ❑ Support ArcMap joins and relates
- ❑ Integer ESRI grids have real tables
- ❑ Support ArcMap joins and relates
- ❑ Support user-defined fields
- ❑ Use fields in analysis and queries



Attributes of 037076C8.TIF

| ObjectID | Value | Red | Green | Blue |
|----------|-------|-------------------|-------------------|----------------------|
| 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | 0.996108949416342 | 0.996108949416342 | 0.996108949416342 |
| 2 | 2 | 0 | 0.589852750438697 | 0.640634775310903 |
| 3 | 3 | 0.79298084992752 | 0 | 8.98451209277485E-02 |
| 4 | 4 | 0.511726558327611 | 0.257816433966583 | 0.144533455405508 |
| 5 | 5 | 0.785168230716411 | 0.914076447699702 | 0.613290608072023 |
| 6 | 6 | 0.535164415960937 | 0.199221789883268 | 0.500007629510948 |
| 7 | 7 | 0.996108949416342 | 0.914076447699702 | 0 |
| 8 | 8 | 0.852353704127565 | 0.882825970855268 | 0.882825970855268 |

Record: 1 Show: All Selected Records (0 out of 256 Selected) Options



Attributes of topoelev2

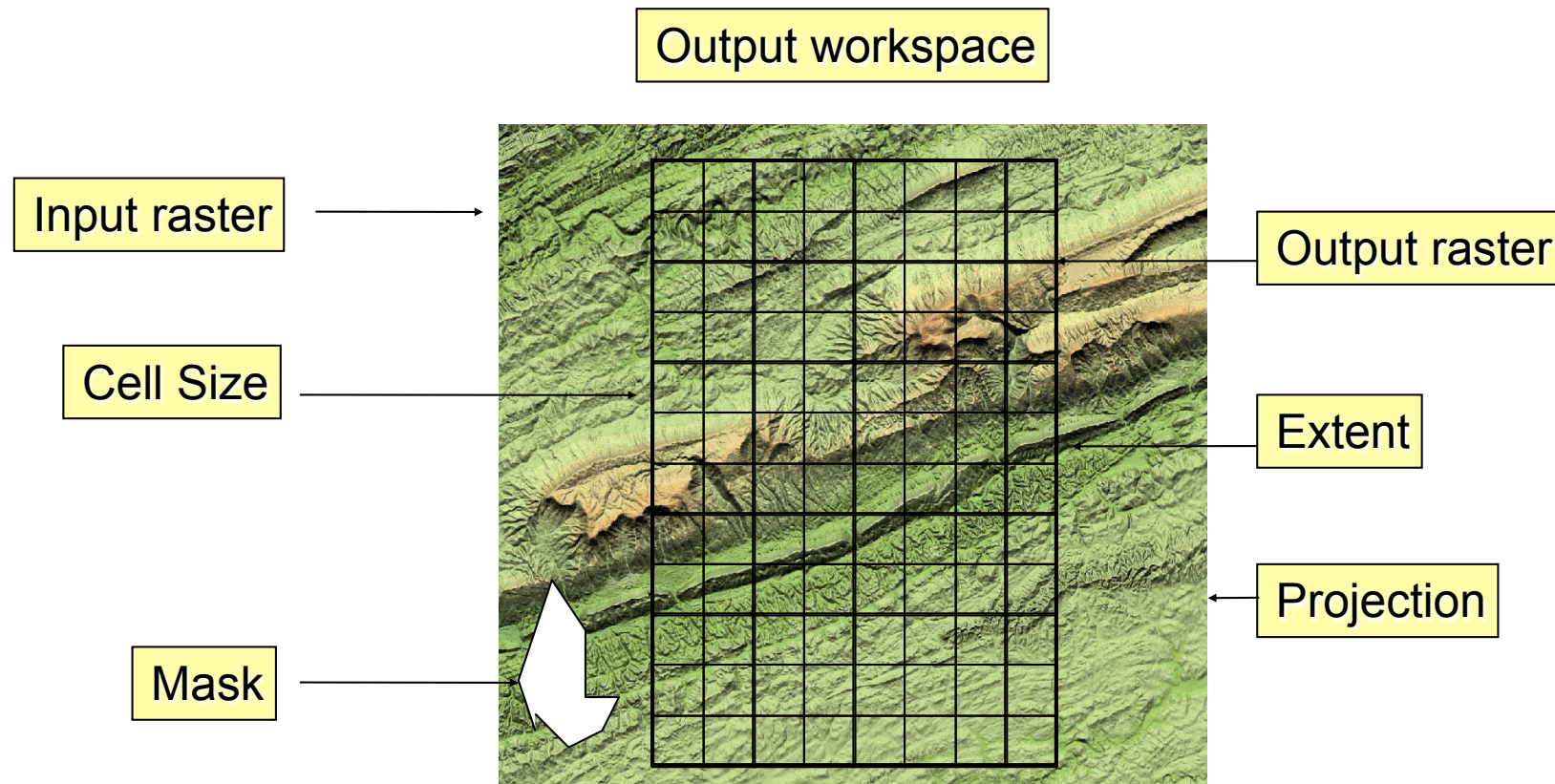
| ObjectID | Value | Count |
|----------|-------------------|-------|
| 0 | -3.27999997138977 | 1 |
| 1 | -2.77999997138977 | 1 |
| 2 | -2.57999992370605 | 1 |
| 3 | -2.38000011444092 | 2 |
| 4 | -2.27999997138977 | 2 |
| 5 | -2.07999992370605 | 5 |
| 6 | -1.98000001907349 | 4 |
| 7 | -1.87999999523163 | 9 |
| 8 | -1.77999997138977 | 3 |

Record: 1 Show: All Selected Records (0 out of 256 Selected) Options

The analysis environments - hands on in ArcMap

□ Control how an output raster is created

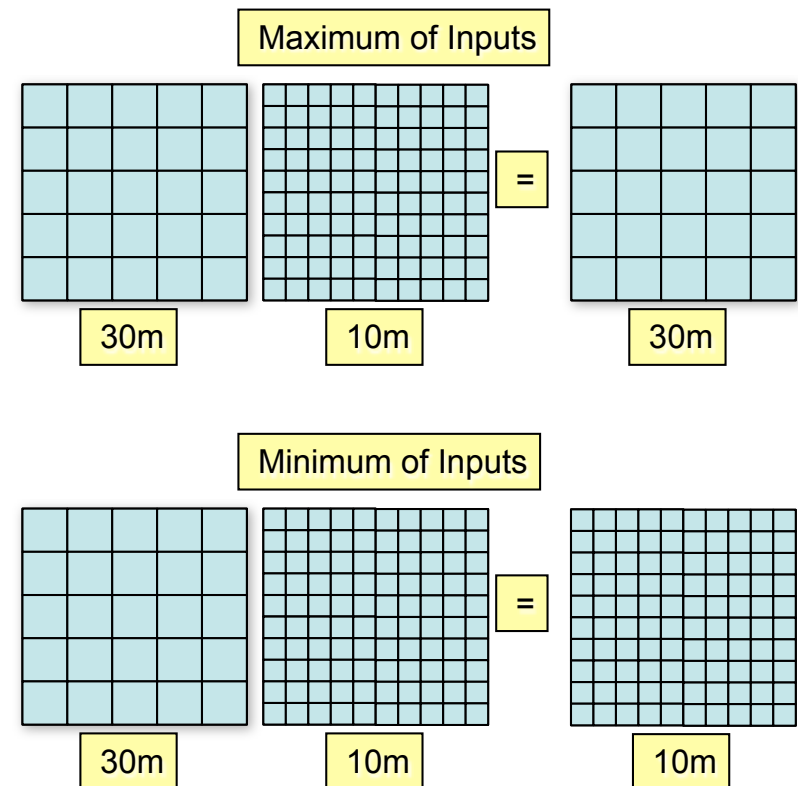
- Set for geoprocessing and Spatial Analyst toolbar — independent



Setting the output cell size

- ❑ Rasters are resampled during analysis
 - Combine rasters with different cell sizes, output another size

- ❑ Output options:
 - Maximum of inputs (default)
 - Minimum of inputs
 - Same as layer
 - As specified



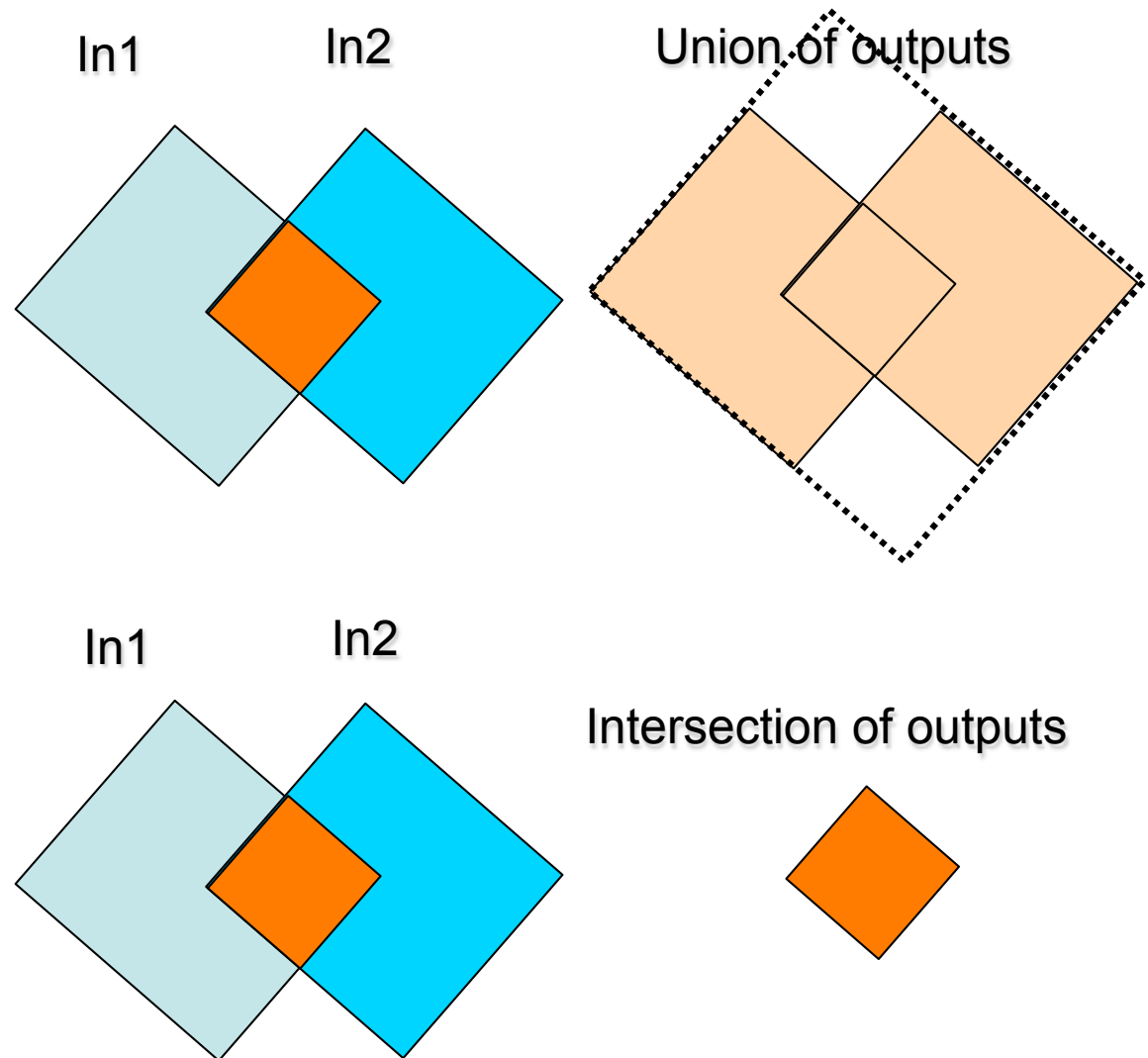
Setting the output extent

☐ Controls the width and height of the output raster

- Combine rasters with different extents, output another extent

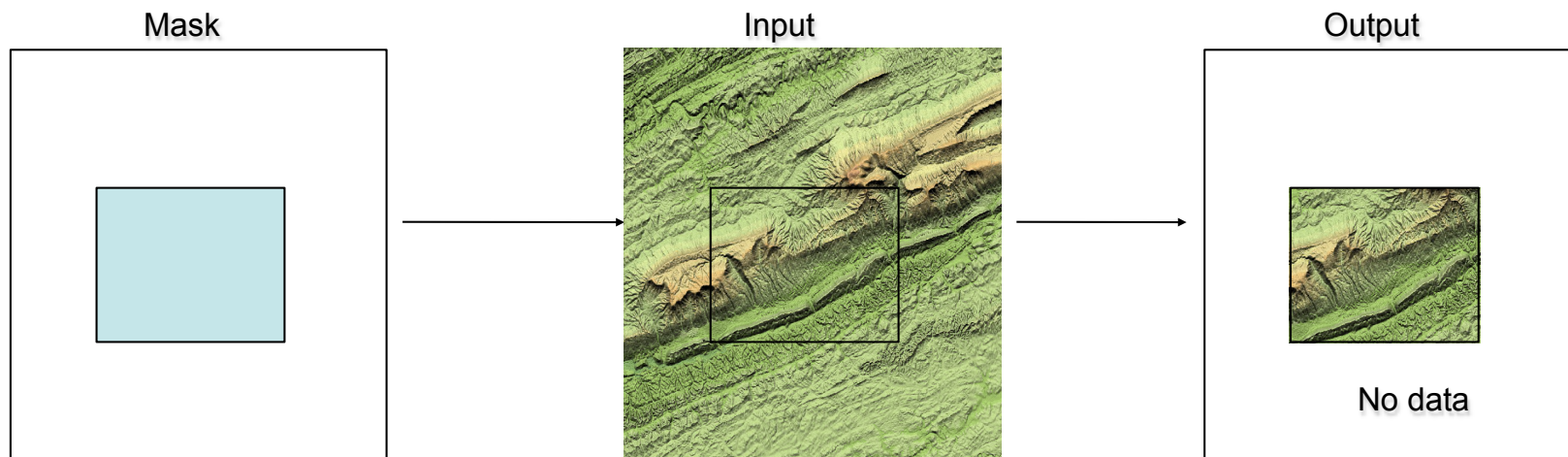
☐ Output options:

- Union of inputs (default)
- Intersection of inputs
- Same as layer
- Same as display
- As specified



Setting the analysis mask

- ❑ **Defines areas where analysis is performed**
 - Useful for clipping to irregular shapes
- ❑ **Vector mask**
 - Only cells covered by features are output (others set to NoData)
 - Create a feature mask with selection and export
- ❑ **• Raster mask**
 - Only cells covered by valued cells are output (others set to NoData)
 - Create a raster mask with several Spatial Analyst techniques



Python Exercise



- copy `geol588/data/588_python_img_exercises` to your folder (E:)
- on python code (.py), snake-icon: right-click - Edit with Idle)
- **Idle**: editor window (write code), shell window (output)
- **Run code**: click on editor, Press **F5** (yes to save)
- will print output into shell window
- Abort (“hanging”): Press Control-F6
- Let’s look at `I_show_raster_true_elev_in_ft.py`