



MIDTERM, SDGS, SQL QUERIES, AND TABLE JOINS

MIDTERM

- The midterm project will use knowledge gained from class lectures, lab assignments, and readings to inform how GIS is currently being used or how it could be used to help address local and global challenges. Examples of such challenges include natural disasters, crime, poverty, disease spread, etc. Please feel free to choose a topic related to your field. You will employ critical thinking to determine if geospatial thinking and technologies can help to achieve the United Nations Sustainable Development Goals (SDGs) based on your assessment of the global challenge chosen.
- There will be two project deliverables detailed below, a 2-page paper, a 3-minute elevator pitch (one PowerPoint slide allowed), and a minimum of one ArcGIS map to support your paper and presentation. Example visuals and instructions will be given to help guide you. You will also be given some class time to work on these assignments and you may meet with me during my office hours if you need help. Deliverables and assignments should be submitted via Assignments on MyCourses unless otherwise noted.

MIDTERM

- **2/8: Deliverable 1**

- On MyCourses **Discussions (not dropbox)**, please post the local challenge (and where it is) you will be exploring for the midterm. This should be no longer than one sentence.
- *For example: I am going to explore the challenge of poverty in the city of Rochester, NY.*

- **2/20: Deliverable 2**

- Submit the background section of your paper to Dropbox as well as a brief outline for your paper/presentation (the outline should be similar for both)

- **3/4: Midterm**

- Both the presentation slide and paper should be submitted to Dropbox by class time. Presentation order will be assigned randomly and will take place 3/4 and 3/6 in the classroom.

MIDTERM

- **Assignment:** Pick a local challenge (does not have to be Rochester, just a challenge on a local scale) and write a 3-minute elevator pitch about a GIS solution for that challenge. You will detail the background of the challenge, the potential GIS solution (current or proposed), and your thoughts on why/why not GIS tools can be used to help achieve sustainable development in the chosen area. Does your challenge fall under any of the SDGs? If so, why?
- Public speaking is a necessary evil and an elevator pitch will help you to be clear and concise in your thinking. Think of this as practice for a future job interview—communication skills are key! It is important to remember that your audience must understand what you are talking about and you need to make them care about it.
- Components of your elevator pitch:
 - Background information (what is the challenge?)
 - Problem (why is this a problem locally? Is it a problem on the global scale too?)
 - Solution (what solution(s) have been proposed/applied? Do you think they will contribute to addressing the challenge/achieving sustainable development?)
 - Big picture: who cares?
 - End with a goal/central message
- Tell a compelling story and have fun with this. You may have a single PowerPoint slide to support your pitch and you will be given a 30-second warning.



SUSTAINABLE DEVELOPMENT GOALS



<https://youtu.be/DdLqiTvFwJk>

THE SDGS ARE ...

- A pathway to sustainable development
- A set of 17 goals for the world's future, through 2030
- Backed up by a set of **169 detailed Targets**
- Negotiated over a two-year period at the United Nations
- Agreed to by nearly all the world's nations, on 25 Sept 2015

**Each goal is
important
in itself ...**

Geospatial information services and platforms have become key contributors to improved decision making and policy formulation:
Helps governments, NGOs, and researchers to analyze, monitor, and report on global concerns



**And they
are all
connected**

With regard to 'means of implementation' the Open Working Group on Sustainable Development Goals calls for greater data monitoring and accountability, and by 2020 'increase significantly the availability of high-quality and timely data'.

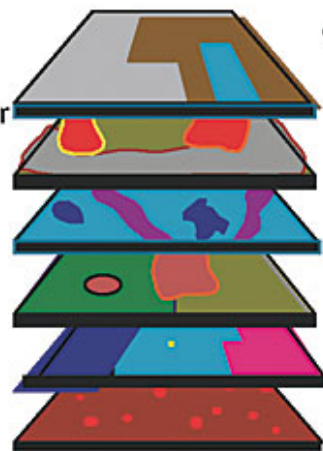
These slides are provided as a free public service by 17Goals, a multi-stakeholder partnership.

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**High quality, timely
and reliable data**

Geodetic
Elevation
Water/Ocean
Land use/cover
Transport
Cadastre
Population
Infrastructure
Settlements
Admin. Bdys.
Imagery
Geology/soils
Observations
etc.



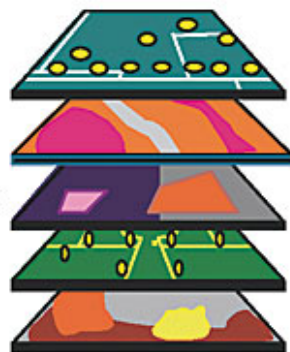
**National Spatial
Data Infrastructure**



UN-GGIM

United Nations Secretariat
Global Geospatial Information Management

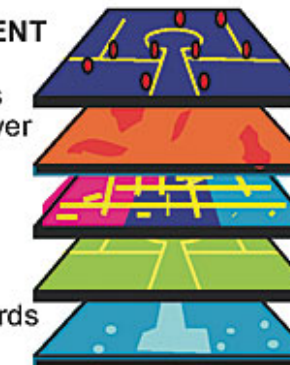
SOCIAL
Society
Poverty
Education
Health
Population
Employment
Water
Sanitation
Equality
Gender
Governance



ECONOMIC
Well-being
Cities
Water
Energy
Infrastructure
Industry
Sanitation
Economy



ENVIRONMENT
Water
Seas/oceans
Land use/cover
Ecosystems
Forests
Agriculture
Climate
Biodiversity
Natural hazards
Pollution



Positioning geospatial information to address global challenges

ggim.un.org



How are the goals going so far?

<https://dashboards.sdgindex.org/#/>

<https://sustainabledevelopment.un.org/partnership/reports/>

<https://myworld2030.org/>

QUERYING AND SELECTING DATA

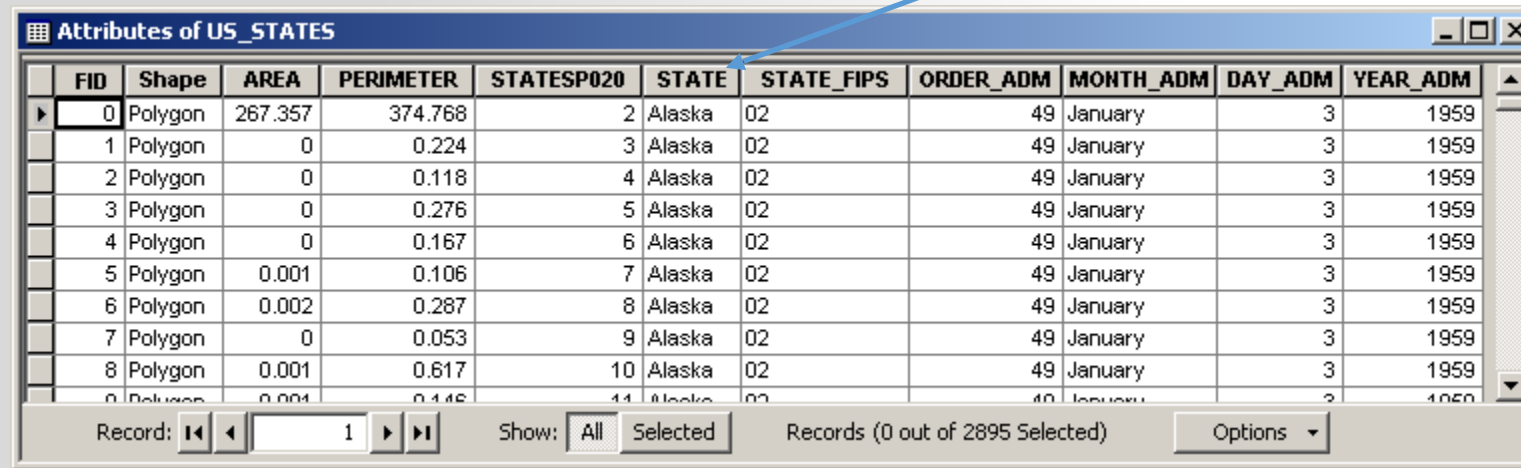
- Query – ask a question
- Many ways to query data in ArcMap
 - Identify tool
 - Using a graphic
 - Select by Location
 - Select by Attribute
 - Find tool

QUERY BASICS

```
SELECT * FROM US_STATES WHERE STATE = 'Alaska'
```

“give me everything from the table US_STATES”

“where the value of the STATE column is equal to the value ‘Alaska’”



Attributes of US_STATES

	FID	Shape	AREA	PERIMETER	STATESP020	STATE	STATE_FIPS	ORDER_ADM	MONTH_ADM	DAY_ADM	YEAR_ADM
▶	0	Polygon	267.357	374.768	2	Alaska	02	49	January	3	1959
	1	Polygon	0	0.224	3	Alaska	02	49	January	3	1959
	2	Polygon	0	0.118	4	Alaska	02	49	January	3	1959
	3	Polygon	0	0.276	5	Alaska	02	49	January	3	1959
	4	Polygon	0	0.167	6	Alaska	02	49	January	3	1959
	5	Polygon	0.001	0.106	7	Alaska	02	49	January	3	1959
	6	Polygon	0.002	0.287	8	Alaska	02	49	January	3	1959
	7	Polygon	0	0.053	9	Alaska	02	49	January	3	1959
	8	Polygon	0.001	0.617	10	Alaska	02	49	January	3	1959
	9	Polygon	0.001	0.145	11	Alaska	02	49	January	3	1959

Record: 1 Show: All Selected Records (0 out of 2895 Selected) Options

SQL

- Structured Query Language
- Used Implicitly and Explicitly in ArcGIS
- Combine tables, fields, operators, much more..

```
SELECT Book.title,  
       count(*) AS Authors  
FROM Book  
      JOIN Book_author ON Book.isbn = Book_author.isbn  
GROUP BY Book.title
```

Example output might resemble the following:

Title	Authors
SQL Examples and Guide	3
The Joy of SQL	1
How to use Wikipedia	2
Pitfalls of SQL	1

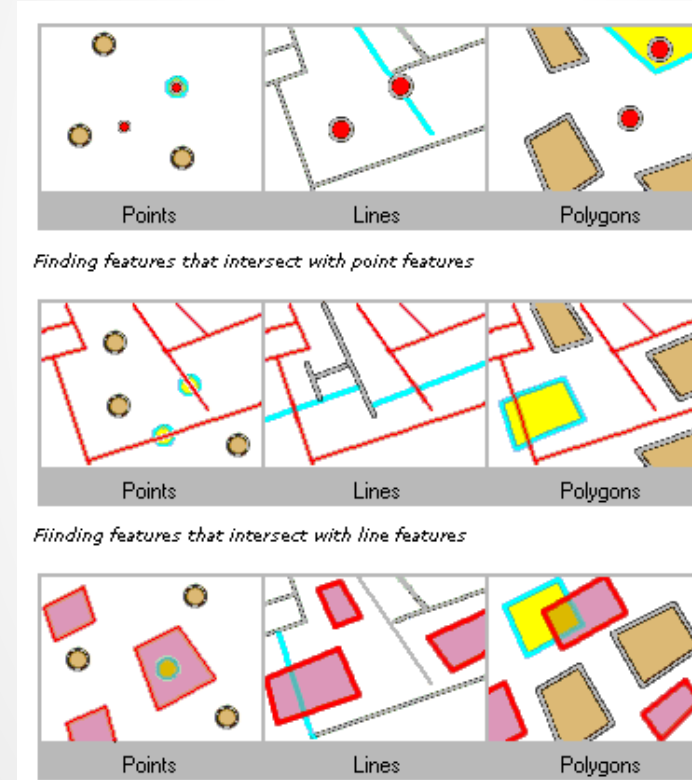
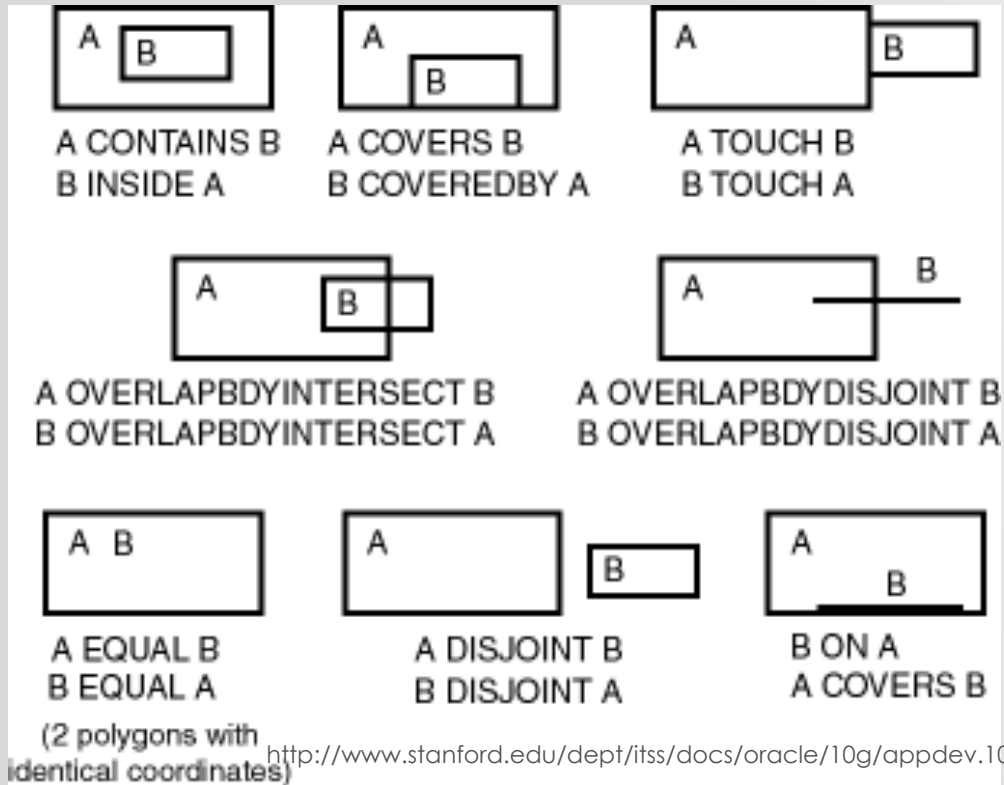
```
SELECT title,  
       count(*) AS Authors  
FROM Book  
      NATURAL JOIN Book_author  
GROUP BY title
```

SQL WHERE OPERATORS

Operators	Usage
Comparison operators	
=	Equal
<>	Not equal
<	Less than
>	Greater than
<=	Less than or equal to
>=	Greater than or equal to
Logical operators	
AND	Joins two conditions and returns results when both are true
OR	Joins two conditions and returns results when either is true
NOT	Negates any logical expression or keywords such as like, null, between, in, and exists
Arithmetic operators	
+	Addition
-	Subtraction
/	Division
*	Multiplication

* <http://iuiedocs.oesmupl.com/du/images/operators.png>

SPATIAL OPERATORS FOR QUERYING



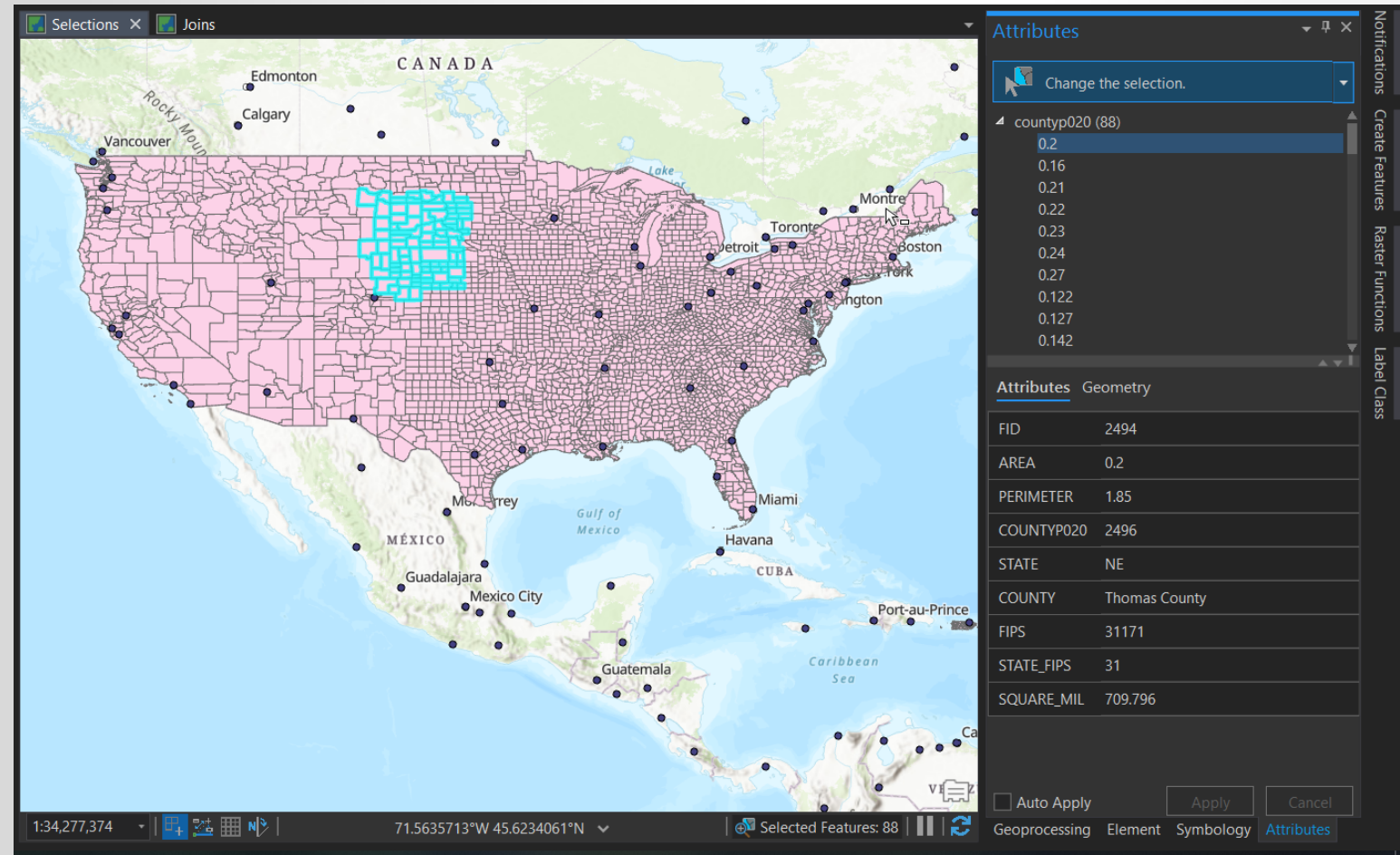
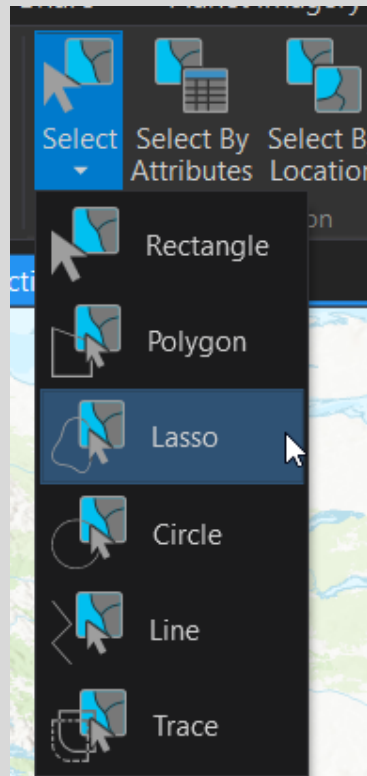
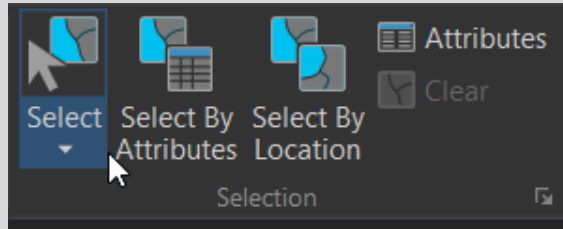
Intersect Example

Non-exhaustive list

See ArcGIS Help Topic “Select By Location dialog” for more info

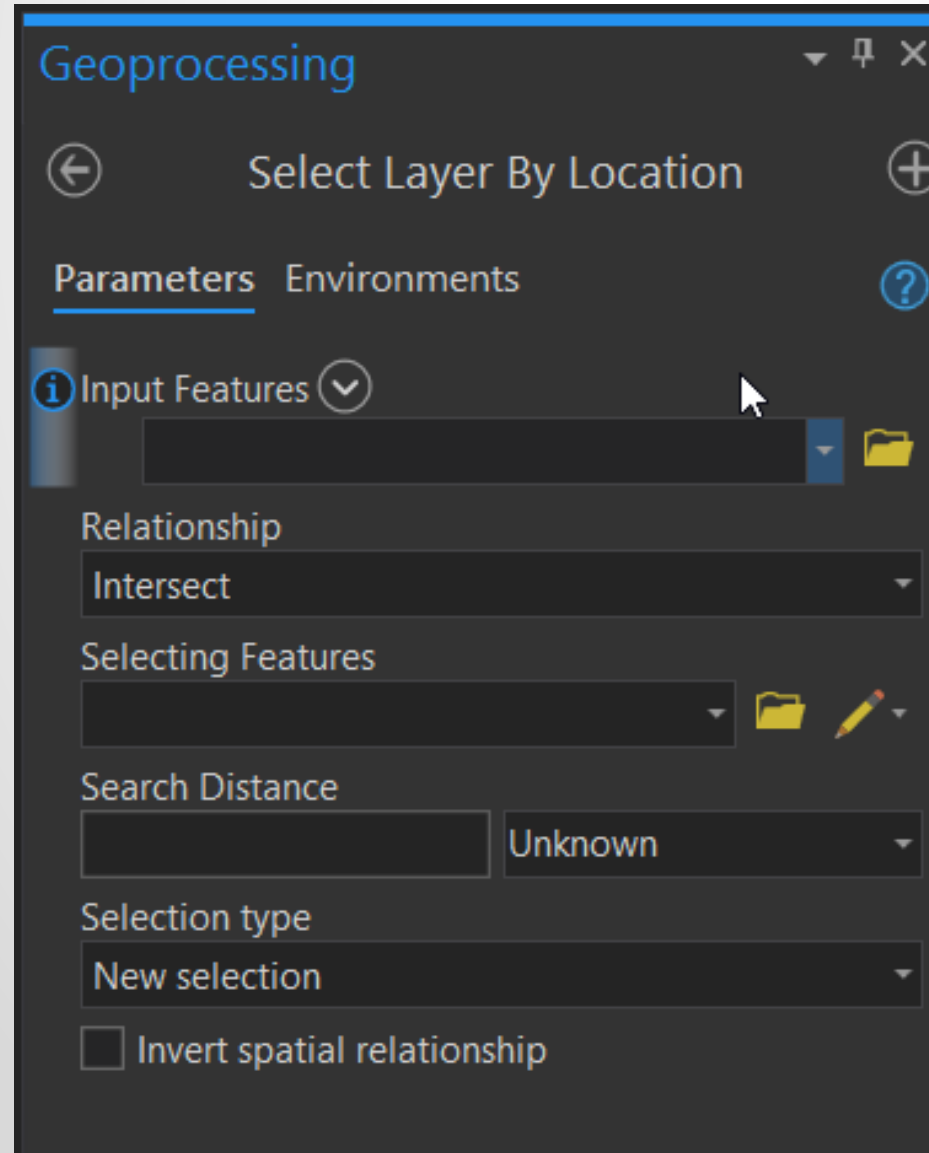
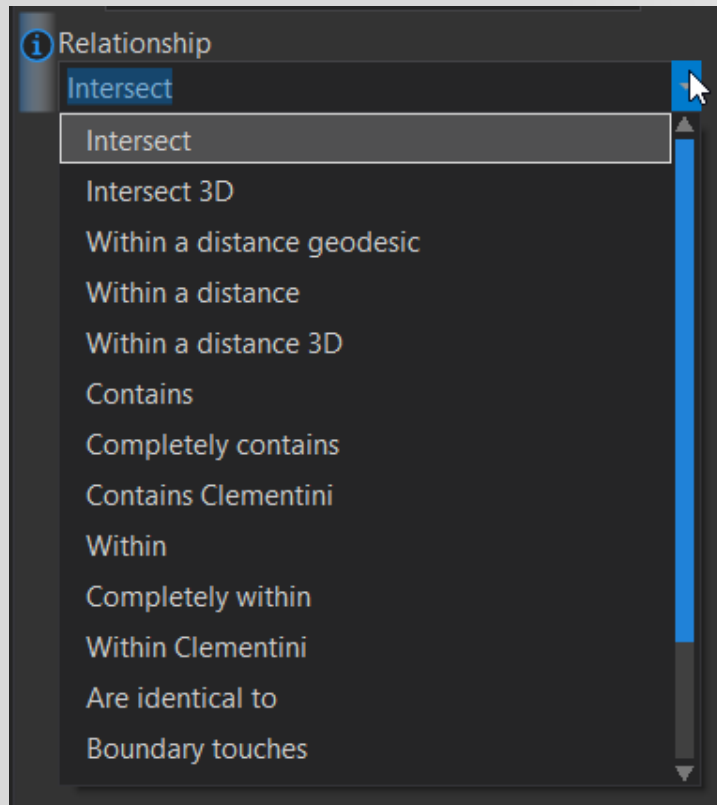
Used as a “spatial” WHERE clause

INTERACTIVE SELECTION TOOL



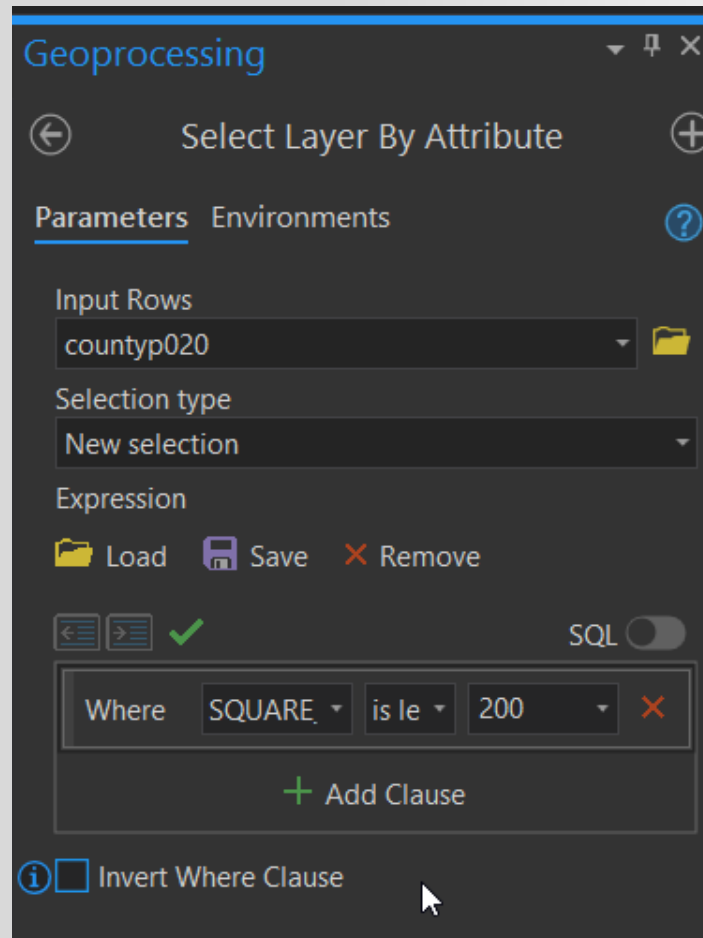
SELECT BY LOCATION

- Uses Spatial Operators



SELECT BY ATTRIBUTE

- Build the WHERE part of query



Full query
being built

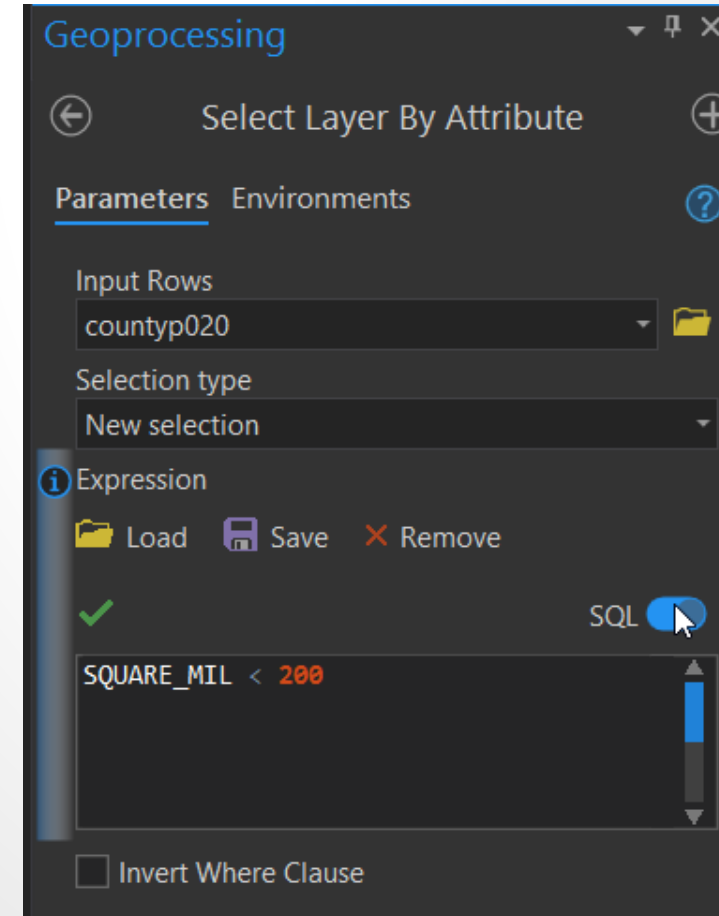
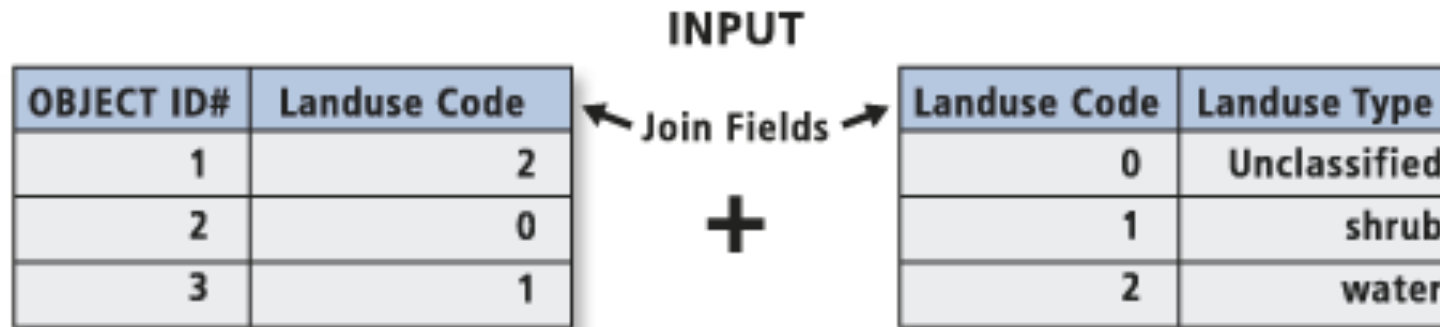


TABLE JOIN

“Appending the fields of one table to those of another through an attribute or field common to both tables. A join is usually used to attach more attributes to the attribute table of a geographic layer.”



OUTPUT

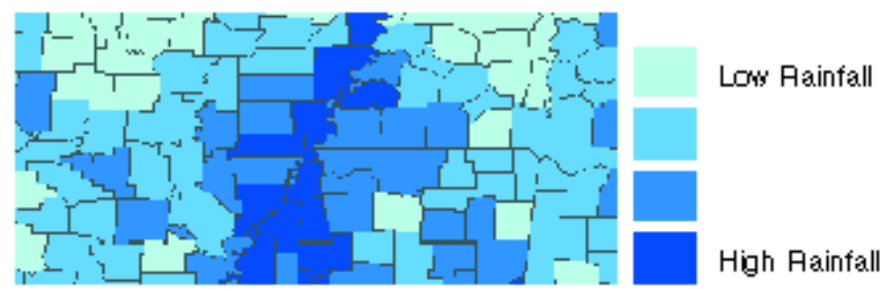
OBJECT ID#	Landuse Code	Join Table Landuse Code	Join Table Landuse Type
1	2	2	water
2	0	0	Unclassified
3	1	1	shrub

Shape	FID	LU_Code	LU-Code	Description
Polygon	1	2	1	Single Family
Polygon	2	1	2	Agriculture
Polygon	3	1	3	Commercial

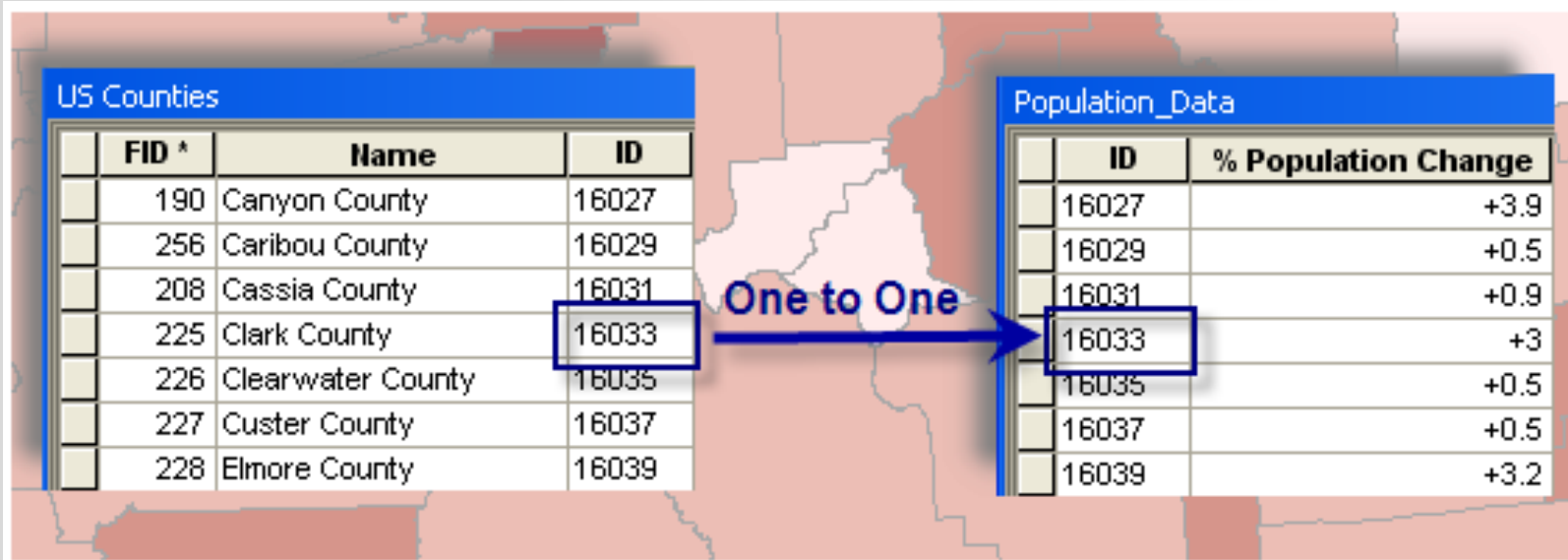


Join on number

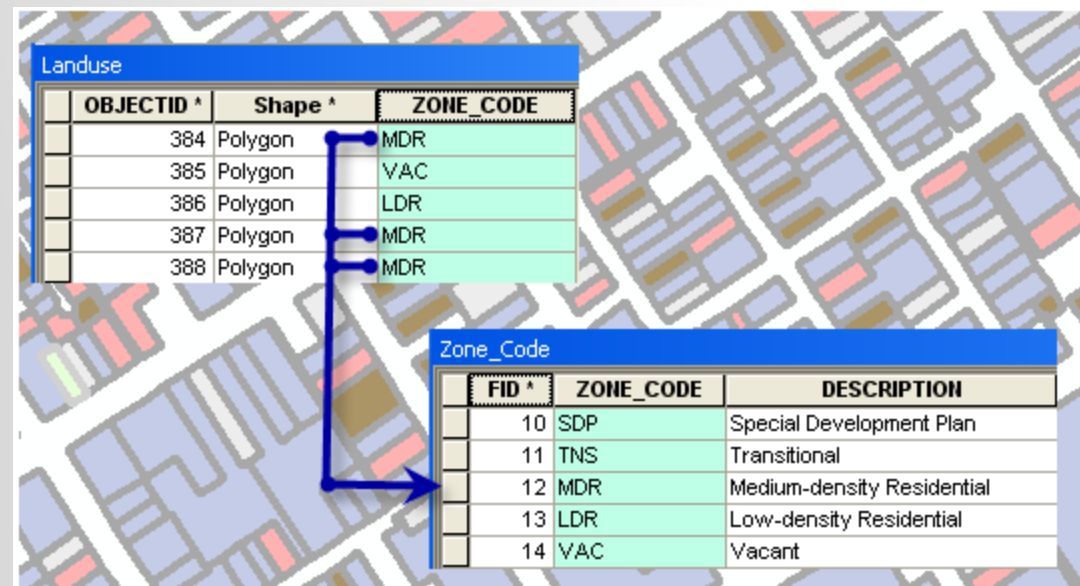
Shape	FID	County	County	Rain	Total
Polygon	1	Atoka	Atoka	1.80	10.16
Polygon	2	Kiowa	Kiowa	2.34	13.67
Polygon	3	Nowata	Nowata	1.62	11.90

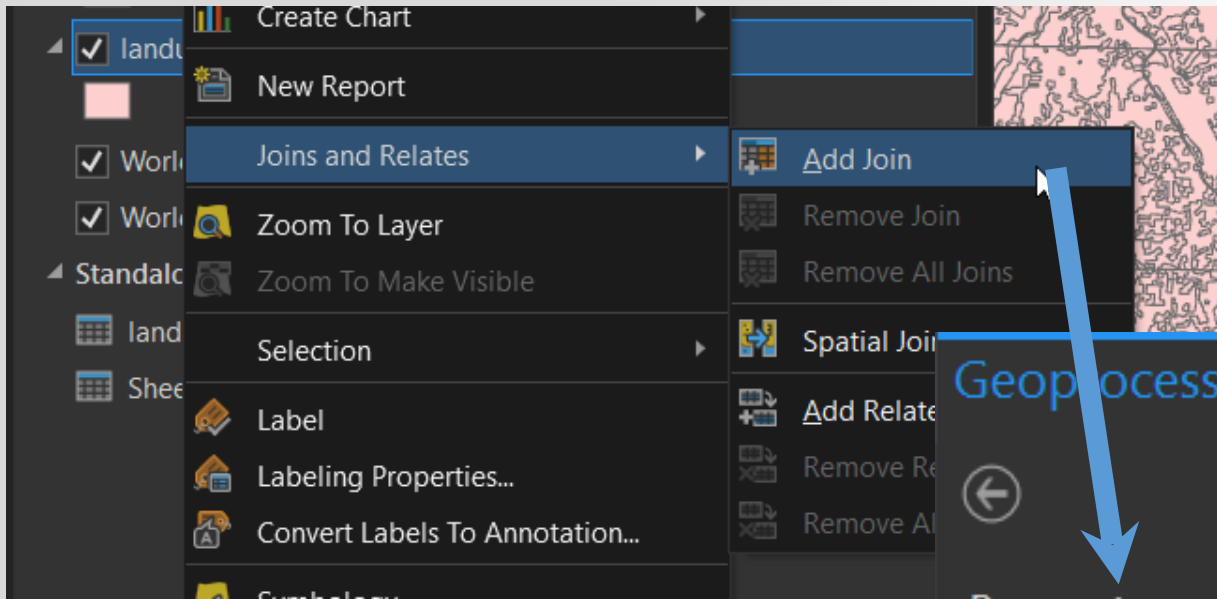


Join on string (text)



One to Many





Geoprocessing

Add Join

Parameters Environments ?

Layer Name or Table View
landuse_utm83

⚠ Input Join Field
LUCODE

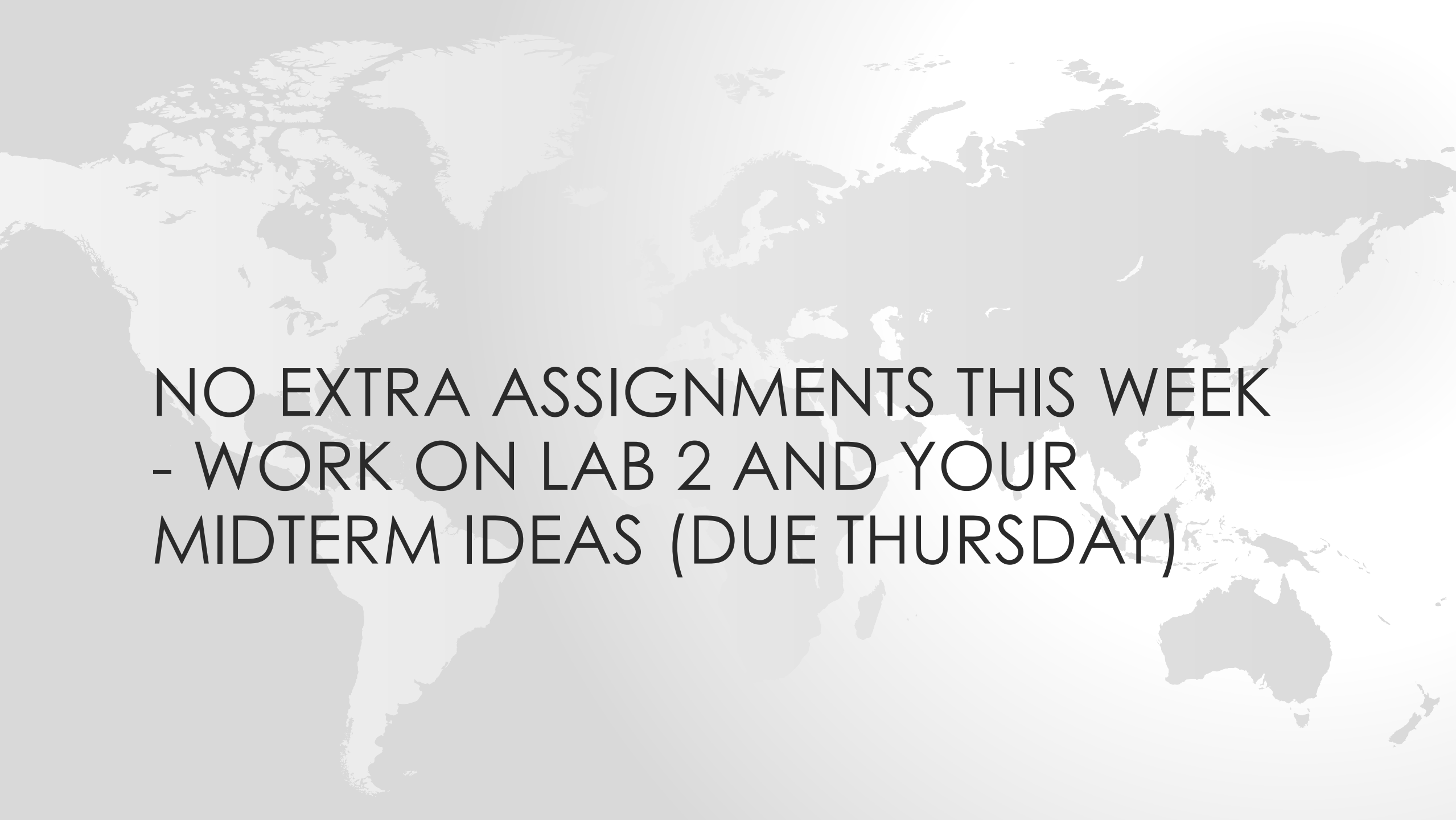
Join Table
landusecodes.txt

Output Join Field
Code

☒ Keep All Target Features

HANDS-ON – QUERYING AND TABLE JOINS

- Please do not do these steps until told to do so by the instructor (i.e. no skipping ahead)
- Download and unzip locally the file Week3_hands_on_materials.zip from myCourses under Content Week 3
- Look at a File Geodatabase
- Select by location (counties/cities) (All cities within NY counties)
- Table join (observe different data types)



NO EXTRA ASSIGNMENTS THIS WEEK
- WORK ON LAB 2 AND YOUR
MIDTERM IDEAS (DUE THURSDAY)