Today

- Voting “quiz” on chapter 4
- Chapter 5: Queries
- today: attribute/SQL queries - some advanced cases
- Follow along: copy data\follow along \ch5A_class_ex folder in your student folder.
  Reconnect Usdata/states?
- Saving selections in layers and exporting to a file
- Definition query
- Interactive selection

Find the **WRONG** statement:
- a single number
- The result of a select-by-attribute SQL query on a **standalone** table is:
  - a selection of records
- Some light blue stuff a selection of features

“Statistics” operation vs. “Summary” operation - which statement is **wrong**?

Statistics shows statistics only for a single field
Summary only creates a new standalone table
Summary uses one field to group and shows group member statistics
Statistics creates a COUNT_ field
USA county data
for each county you have:
(county) NAME, POP and STATE_NAME

Select by
Attribute?    Statistics?    Summarize?

Hot to use Attribute (SQL) query, Statistics or Summarize (and possibly combine them?) to:
• Find all counties with > 7000 people?
• Find total number of people in each state?
• Total number of people in US?
• Number of counties with > 5000 people per state

SQL (Select by Attribute) Queries
• class exercise data in data/follow along/ch5A_class_ex (Iowa cities as polygons)
• select/query means: “grab only those records for which <statement> is true”
• Result: new selection (light blue)
• Note the Selection Methods (New, Add, Remove, Select) Default: new selection
• Check for correct syntax first (Verify), then Apply
• Click Help to get examples of more complex queries

Notes on SQL syntax differences
• Syntax for Shapefile is:
  • “ as Field delimiter “Age”
  • NOT Case sensitive: ‘bob’, ‘BOB’, ‘bOB’ are all equal
  • Wildcards: % for many, _ for only one

• Syntax for Geodatabases (i.e. your Usdata Geodb!) is:
  • [] as Field delimiters [Age]
  • Case sensitive: ‘BOB’ is different from ‘Bob’!
  • Wildcards: * for many, ? for only one

Elements of a SQL query
• <Field> <Relation> <Value>
  • Field in double quotes: “POP2000”
  • Relation: >, =, <=, <>, LIKE, AND, OR, ...
  • Value:
    • Strings (words) : ‘Iowa’ (in single quotes!)
    • Floating point: 1.2353245 (no quotes)
    • Integer: 1984 (no quotes)
bullet Math with Fields and/or Values (+, -, *, /, =, <>)
  "POP2000" - "POP1990" > 10000
  "POP2000" - 10000 > "POP1990"
  "POP2000" > "POP1990" * 1.2
  "POP1990" <> 9646
  "POP1990" = 7174

Attributes of Counties standalone table:

<table>
<thead>
<tr>
<th>OBJ</th>
<th>RANK</th>
<th>ST</th>
<th>CO</th>
<th>JFIPS</th>
<th>COUNTYNAME</th>
<th>STATE</th>
<th>POP1990</th>
<th>POP2000</th>
<th>POP CH</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>10</td>
<td>CO</td>
<td></td>
<td>10000</td>
<td>Douglas County</td>
<td>CO</td>
<td>60599.0</td>
<td>176798</td>
<td>115375.0</td>
</tr>
<tr>
<td>1</td>
<td>51</td>
<td>FL</td>
<td></td>
<td>10000</td>
<td>Pinellas County</td>
<td>GA</td>
<td>54635.0</td>
<td></td>
<td>54635.0</td>
</tr>
<tr>
<td>2</td>
<td>22</td>
<td>IL</td>
<td></td>
<td>10000</td>
<td>DuPage County</td>
<td>IL</td>
<td>86144.0</td>
<td></td>
<td>86144.0</td>
</tr>
<tr>
<td>22</td>
<td>22</td>
<td>IL</td>
<td></td>
<td>10000</td>
<td>Lake County</td>
<td>IL</td>
<td>100191.0</td>
<td></td>
<td>100191.0</td>
</tr>
<tr>
<td>3</td>
<td>22</td>
<td>IL</td>
<td></td>
<td>10000</td>
<td>Cook County</td>
<td>IL</td>
<td>27955.0</td>
<td>489376.0</td>
<td>489376.0</td>
</tr>
<tr>
<td>9</td>
<td>143</td>
<td>VA</td>
<td></td>
<td>10000</td>
<td>Loudoun County</td>
<td>VA</td>
<td>88320.0</td>
<td>168556.0</td>
<td>88419.0</td>
</tr>
<tr>
<td>6</td>
<td>143</td>
<td>VA</td>
<td></td>
<td>10000</td>
<td>Alexandria County</td>
<td>VA</td>
<td>41611.0</td>
<td>168556.0</td>
<td>41611.0</td>
</tr>
<tr>
<td>7</td>
<td>531</td>
<td>UT</td>
<td></td>
<td>10000</td>
<td>Salt Lake County</td>
<td>UT</td>
<td>102191.0</td>
<td></td>
<td>102191.0</td>
</tr>
<tr>
<td>5</td>
<td>143</td>
<td>VA</td>
<td></td>
<td>10000</td>
<td>Prince William County</td>
<td>VA</td>
<td>46534.0</td>
<td>53004.0</td>
<td>41794.0</td>
</tr>
<tr>
<td>10</td>
<td>143</td>
<td>VA</td>
<td></td>
<td>10000</td>
<td>Arlington County</td>
<td>VA</td>
<td>21920.0</td>
<td>140939.0</td>
<td>140939.0</td>
</tr>
<tr>
<td>4</td>
<td>143</td>
<td>VA</td>
<td></td>
<td>10000</td>
<td>Alexandria City</td>
<td>VA</td>
<td>244796.0</td>
<td>424796.0</td>
<td>227609.0</td>
</tr>
<tr>
<td>11</td>
<td>143</td>
<td>VA</td>
<td></td>
<td>10000</td>
<td>District of Columbia</td>
<td>DC</td>
<td>60550.0</td>
<td>500000.0</td>
<td>41794.0</td>
</tr>
<tr>
<td>12</td>
<td>22</td>
<td>NY</td>
<td></td>
<td>10000</td>
<td>Suffolk County</td>
<td>NY</td>
<td>2069022.0</td>
<td>1727695.0</td>
<td>6213265.0</td>
</tr>
<tr>
<td>13</td>
<td>51</td>
<td>FL</td>
<td></td>
<td>10000</td>
<td>Broward County</td>
<td>FL</td>
<td>524145.0</td>
<td></td>
<td>89607.0</td>
</tr>
</tbody>
</table>

Gotcha Warning: AND vs OR

Incorrect
  ".... get all features for CO and for IA ..."
  "State" = 'CO'
  AND
  "State" = 'IA'
  ... get all counties that have between 50,000 and 90,000 people ...
  "POP2000" >= 50000
  OR
  "POP2000" < 90000

Correct
  "State" = 'CO'
  OR
  "State" = 'IA'
  ... get all counties that have between 50,000 and 90,000 people ...
  "POP2000" >= 50000
  AND
  "POP2000" < 90000

String ("word") queries

bullet String values (words) need to be in single quotes
bullet Use Get Unique Values for an overview of possible values
  Acid
bullet Exactly: "ZIP" = '50010', "Capital" = 'Y'
  "ZIP" = '50010' AND "Capital" = 'Y'
bullet Anything but (not) '50010': "ZIP" <> '50010'
  "ZIP" <> '50010'
bullet Partial matches using wildcards (only with LIKE !):
  _ (underscore) or ? means: exactly one letter
  "Name" LIKE 'Rob' => Rob, Bob but not Bobby

bullet The difference between AND and OR:
  AND: both expressions need to be true
  OR: just one true expression is enough

bullet What's Wrong with?
  "POP" < 100 AND > 200
  "POP2000" > 10000 AND "POP1990" < 10000
  "POP" < 55 OR "AREA" < 234.4

bullet More than three expressions: use () to group:
  "POP" > 10 AND "POP" < 100 ) AND "AREA" > 2.3
SQL queries on the names in this **Geodatabase** table (field is NAME)

- Names starting with N or with M?
- Names, where 2. letter is e?
- Names with Two words? (separator?)
- Names with 2 Os i.e. oo?
- 4-letter names?
- Names where second word is 2 letters long?

Make Layer from selection

- Common operation following a query
- Creates a new layer with only the selected features

Note that the new layer still refers to the original feature class with all the features. But it appears to contain only the selected features.

Exporting selection

Creates new feature class “file” inside a GeoDB, or a new DBase (dbf) file in a folder

Definition query

- Very important: The result is not a selection but a subset
- think: “hide some feature for a while”
- “Show me only where <expression> is true”
- Layer: Properties > definition query
- Only selected features appear on map and in table
- Temporarily treats a layer as being smaller than it actually is
**Interactive Selection**

Default selection method: new selection
But: you can add, remove or sub-select later

Click on feature to select via a shape
Features inside (intersect) the shape are selected.

Hold down **Shift key** to select more than one feature

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**Select by Graphics**

1) Use Drawing toolbar to create graphic (polygon)
2) Then Select by Graphics

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**Lab**

- test: map S: drive to `\geol552\delphi\students`
- find your student folder
- R-click - New - Text Document
- Let me know if you don’t have write access
- Finish HW4
- Tutorial ch 5: 1 - 19