Updates for 2019

- Need to update the map overlay part of this topic. ArcGIS doesn’t exactly work this way anymore. In particular remove the point in pointy, line in poly, and poly on poly stuff. Update the types of layers allowed in overlay operation for the 4 arcgis tools discussed.

Buffers and Setbacks

- Analysis of ________________
- Result in new output polygon layer
  - So different than select by location
When to Buffer

- Three applications of buffers:
  1.
  2.
  3.

Buffers and Setbacks

- Buffers can be applied to:
  - __________
  - __________
  - __________
  - and selected graphics
- Setbacks can be applied to:
  - __________
Buffers and Setbacks

- Buffer/setback distance can be set:
  - By user
  - Based on features attribute value
  - Single ring
  - Multiple rings

Buffers and Setbacks

- Special line buffers include:
  - Side Buffers
    - 
    - 
    - 
  - Ends Types
    - 
    - 

Figure 12.2 Buffering with different buffer distances
Buffers and Setbacks

What about overlapping areas?

- Dissolve options:
  - None
  - All
  - List

- Result in multipart polys
Map Overlay Analysis

- Manual map overlay has been used in various fields since the turn of the last century
- Used:
  - Tracing paper
  - Velum
  - Mylar
  - and photographic techniques
- . . . to combine thematic map data

Map Overlay

- Combines:
  - __________
  - AND
  - __________
  - of two or more input data layers
Map Overlay

- Requirements of input data layers:
  1.
  2.
  3.
Map Overlay

* Type determined by feature geometry:
  - Point in Polygon
  - Line in Polygon
  - Polygon on Polygon
  - Never point on point or line on line

* First layer is referred to as ___________
* Second layer is the ___________
  - Always a polygon

Map Overlay

* Point in Polygon
  - Input = point layer
  - Overlay = poly layer
  - Output = pt layer w/ attributes of both pts & polys

Map Overlay

* Line in Polygon
  - Input = line layer
  - Overlay = poly layer
  - Output = line layer w/ lines dissected by polys & attributes of both lines and polys
Map Overlay

- Polygon on Polygon
  - Input = poly layer
  - Overlay = poly layer
  - Output = poly layer w/ intersecting polys & attributes of both polys

[Diagram]

Two ArcGIS overlay operations achieve all three:
- Union
- Intersection (intersect in ArcGIS)

They differ only in terms of:
- __________________________
- __________________________

Other overlay operations are just variations:
- Symmetrical Difference
- Identity

Map Overlay

- Union
  - Combines extents of __________
    
  - Inputs must be polygon
    - Note how tables are combined, empty fields

[Diagram]
### Map Overlay

**Intersection**
- Combines extents of __________
- Inputs may be pt, line or poly

<table>
<thead>
<tr>
<th>INPUT</th>
<th>OVERLAY</th>
<th>RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>1A1B</td>
</tr>
<tr>
<td>2</td>
<td>B</td>
<td>2A2B</td>
</tr>
</tbody>
</table>

**Symmetrical Difference**
- Combines extents of __________
- Inputs must be of same geometry type

<table>
<thead>
<tr>
<th>INPUT</th>
<th>UPDATE</th>
<th>RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>1A1B</td>
</tr>
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<td>B</td>
<td>2A2B</td>
</tr>
</tbody>
</table>

**Identity**
- Preserves extent of __________
- Input may be pt, line or poly, overlay is poly or same geometry type

<table>
<thead>
<tr>
<th>INPUT</th>
<th>IDENTITY</th>
<th>RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>1A1B</td>
</tr>
<tr>
<td>2</td>
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</tr>
</tbody>
</table>
Map Overlay

- Update
  - Preserves extent of __________
  - Input and Update features must be polygon

<table>
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<th>UPDATE</th>
<th>RESULT</th>
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By the way:

- Union and intersection are both editing tools in addition to overlay functions

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Other Vector Data Analysis Tools

- Clip
Other Vector Data Analysis Tools

- **Eliminate**

Other Vector Data Analysis Tools

- **Erase**

Sources of Error

- Datum/projection errors
- Poor registration
- Topological errors
- Incompatible levels of accuracy/detail

Supposed to be Shared Boundary

Gaps

Silver