• Today: only intersections, union, clip
  (next lecture: dissolve, buffer, merge)
• clip to shape (graphical)
• Midterms, HW6 graded, solutions on WebCT
• Ch 7 Tutorial 1 - 20
• No HW today - but we’ll start miniproj 3 after next lecture
• follow along data Ch7A_class_ex folder
Geoprocessing procedures

• Scenario: need (inside) road length per polygon - but some road features go across polygons!

• Spatial Join: only works on road (segments) that are completely inside - no splitting of lines! (rq 1)

• Need to somehow **split** the road according to the underlying polygon shape (into 3 + 2 new lines)

• Each (sub) line should get the attribute values of the polygon (e.g. color)(and a length!)

• Use a **map overlay** procedure (here: *intersection*) to create a new layer with split lines
Intersection example

• **Intersection** result: each output road-segment gets an attribute from its surrounding polygon

• Enforces **1-to-1 relationship** - no need for a spatial join type summarize

• 2 input layers - 1 output layer

• Output: **lower** “dimension” of input layers

• Here: output is lines (lower dimension of “polygon with line”)

![Diagram](Code 1 and Code 2)
Intersecting polygons and lines

also possible: create intersection points only
Split roads along some landuse polygons: Now a land use type can be associated with each road.

Potential next step: Use Summarize (SUM) to get total road length per type of land use.
Polygon-polygon overlay process

Conceptual: Overlays all polygon features with each other
Constructs all possible (sub) polygons
Possible methods: Intersection, union, clip, erase
More polygon overlay operations (fig. 7.7)

Only graphical operations

Think: **cookie cutter** (overlay shape)

Order matters

Attributes **not** joined

Attributes **joined**!

Mathematical operation, order irrelevant

<table>
<thead>
<tr>
<th>Operation</th>
<th>Input 1</th>
<th>Input 2 (overlay shape)</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>clip</td>
<td>![Clip Input 1] ![Clip Input 2]</td>
<td>![Output Clip]</td>
<td></td>
</tr>
<tr>
<td>erase</td>
<td>![Erase Input 1] ![Erase Input 2]</td>
<td>![Output Erase]</td>
<td></td>
</tr>
<tr>
<td>intersect</td>
<td>![Intersect Input 1] ![Intersect Input 2]</td>
<td>![Output Intersect]</td>
<td></td>
</tr>
<tr>
<td>union</td>
<td>![Union Input 1] ![Union Input 2]</td>
<td>![Output Union]</td>
<td></td>
</tr>
</tbody>
</table>
Clipping roads (lines) with watershed polygon

Red lines: Roads clipped with watershed

How would an *erase* operation look?
Intersect vs. Union

**Intersect** give only those polygons present in all layers (AND)

**Union** combines polygons from all layers (OR)

Output layer: Join all attributes from each table
Analysis Tools - Clip, Erase, Intersect, Union

ArcToolbox

- 3D Analyst Tools
- Analysis Tools
- Extract
  - Clip
  - Select
- Overlay
  - Erase
  - Identity
  - Intersect
  - Symmetrical Difference
  - Union
  - Update

Input Features

- Features
  - zipcode
  - rivers

Output Feature Class

- Z:\data\Iowa Vector Data\zipcode_Intersect1.shp

Join Attributes (optional)

- ALL
  - use ALL

Cluster Tolerance (optional)

- Meters

Output Type (optional)

- INPUT may choose lower geometry here
Graphical (On-the-fly) clipping: Clip to Shape

- Temporary clip applied to a map layout
- Does not create new layers
- Can be performed on many layers simultaneously
- Can be removed when no longer needed
- Set as a data frame property
rq. 5
(graphically)
In class exercise (clip, intersect)

- Copy Ch7a_class_ex folder, open Ch7a_class_ex.mxd
- Look at fig. 7.7
- Clip landforms (input features) with Middle Devonian Rocks (clip features)
  - Attributes of new (clipped) layer? How many polygons?
  - Color by NAME (import colors from landform layer)
- Erase Middle Devonian Rocks (clip features) from landforms (input features)
  - Note: No Erase in ArcGIS student edition
• Intersect Landforms with Middle Devonian Rocks (JoinAttributes = ALL)

• How are intersected attributes different from clipped?

• Union of Des Moines Lobe layer (1 polygon) and Mid. Devonian Rocks
  • Why have some Union polygons no NAME?

• Clip streams with Des Moines Lobe
  • what geometry should the result have?

• Intersect Highways and streams (= bridges?)

• Next lecture: How to get Length/Area calculated for results from clip, intersect, for example:
  • Total length of streams with the DM lobe?
Wrap up

• Mini proj 3 (next week) will focus on spatial joins + overlays

• Lab: ch 7 tut. 1-20 (6-9: dissolve)