

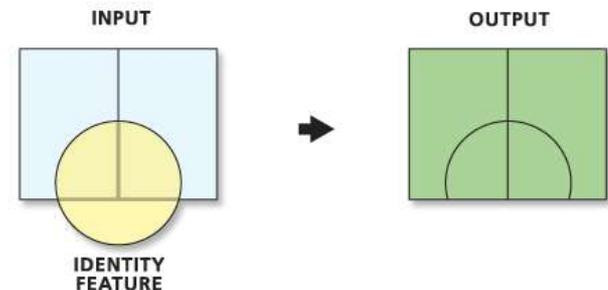
# SPATIAL OPERATIONS

There are some operations in GIS software can be applied to data base in order get the final overlay shapes , if we consider each layer as a transparent sheet and the upper or lower layer exist on other sheet , by overlying these sheets together with applied the logical relations the final new map with all new features can be get .

## ONE : JOINS

### 1- SPATIAL JOINS – IDENTITY

Computes a geometric intersection of the Input Features and Identity Features. The Input Features thereof which overlap Identity Features will get the attributes of those Identity Feature.



## 2- SPATIAL JOINS – INTERSECT

The Intersect tool calculates the geometric intersection of any number of feature layers. The features which are common to (intersect) all inputs will be written to the Output Feature Class.

The input feature classes can be any combination of geometry types (point, line, polygon). The output geometry type can only be of the same geometry or a geometry of lower dimension as the input feature class with the lowest dimension geometry:

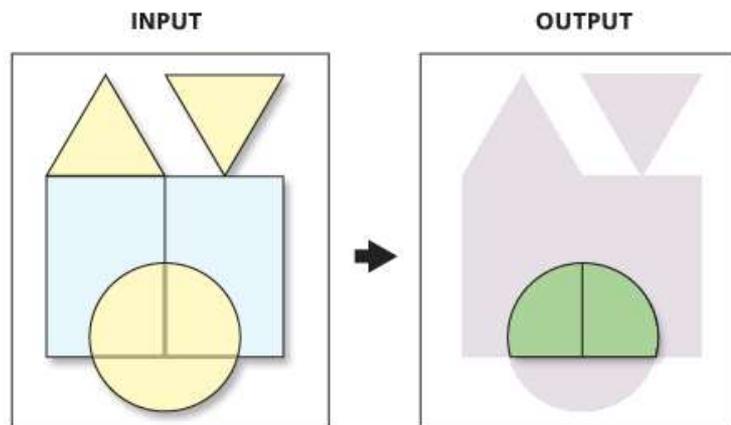
**point = 0 dimension**

**line = 1 dimension**

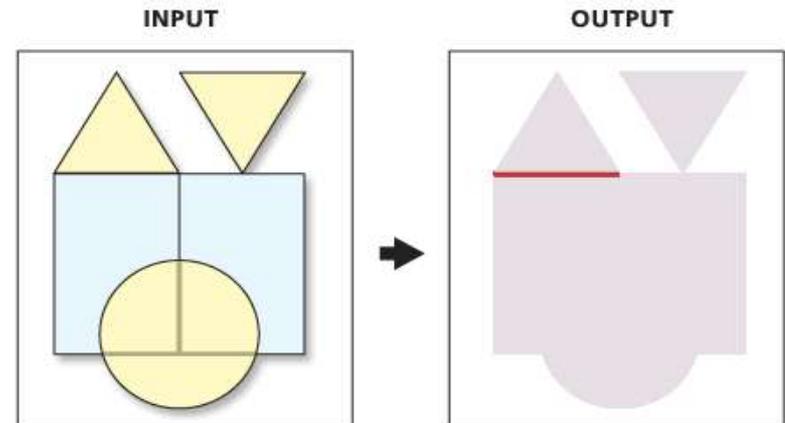
**poly = 2 dimension**

**POLYGON INPUTS AND POLYGON OUTPUT**

**POLYGON INPUTS AND LINE OUTPUT**



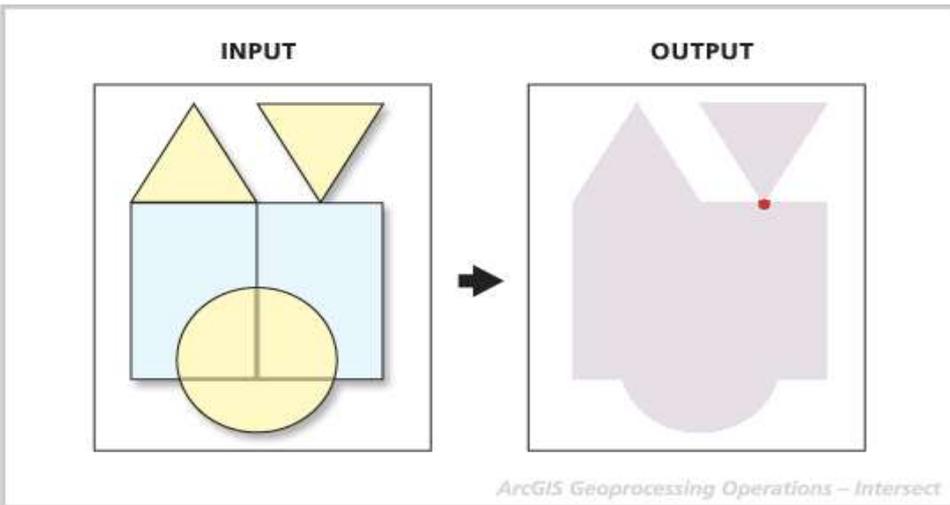
*ArcGIS Geoprocessing Operations – Intersect*



*ArcGIS Geoprocessing Operations – Intersect*

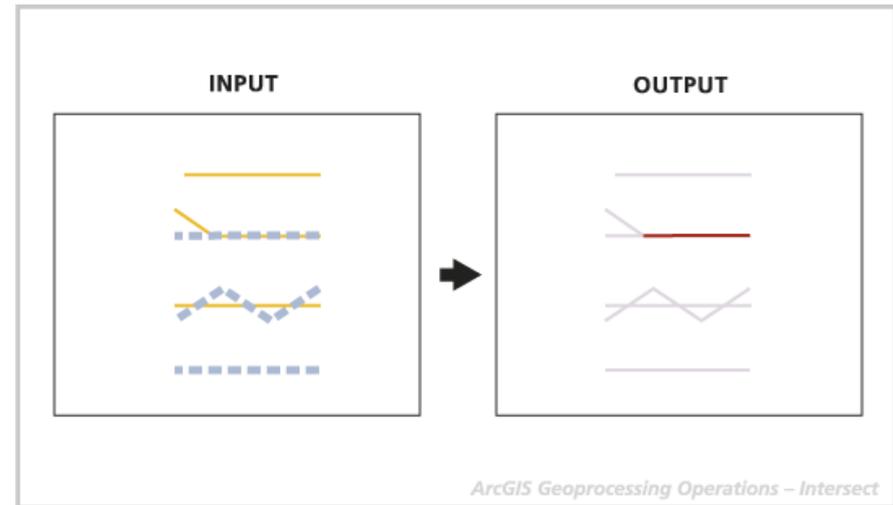
The output line features are where a polygon from one of the input feature classes share a common boundary (intersect at a line) with a polygon from the other input feature

### POLYGON INPUTS AND POINT OUTPUT



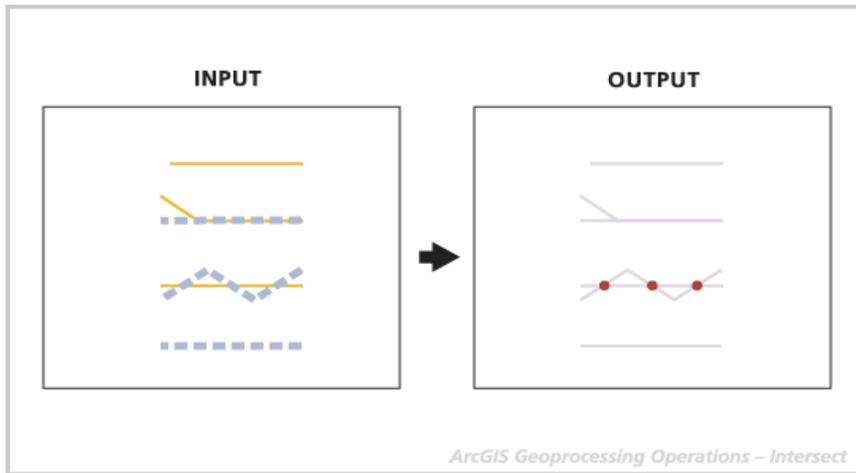
The output point features are where a polygon from one of the input feature classes has a vertex intersecting the boundary (intersect at a point) of a polygon from the other input feature

### LINE INPUTS AND LINE OUTPUT



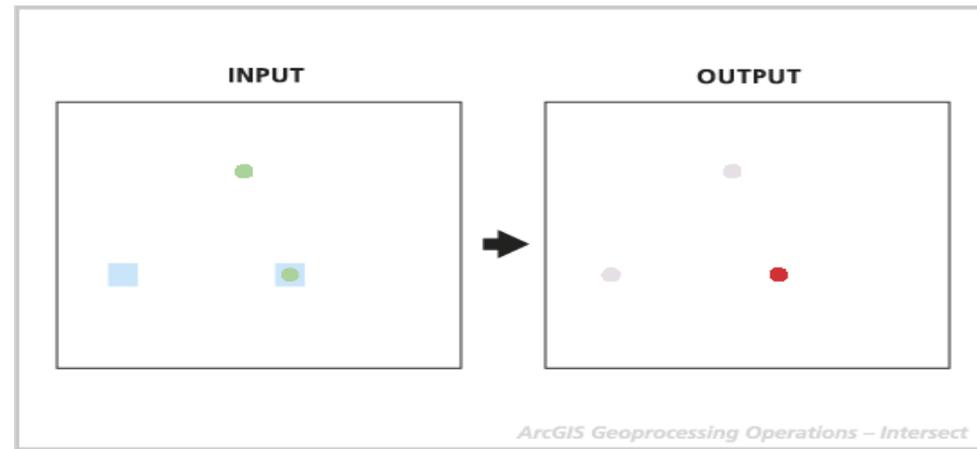
The output line features are where a lines from one of the input feature classes overlap a feature from the other input feature

## LINE INPUTS AND POINT OUTPUT



The output point features are where a line from one of the input feature classes crosses a feature from the other input feature class.

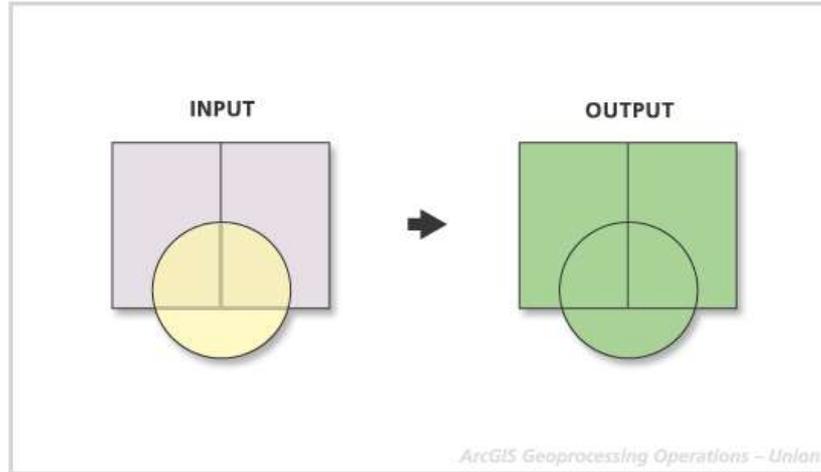
## POINT INPUTS AND POINT OUTPUT



When all the inputs are point feature classes, the intersect tool can be used to determine which points are common to all input feature

## 3- SPATIAL JOINS – UNION

Union calculates the geometric intersection of any number of feature classes and/or feature layers, All inputs must be of a common geometry type and the output will be the same geometry type. This means that a number of polygon feature classes and/or feature layers can be unioned together. The output features will have the attributes of all the input features which they overlap.



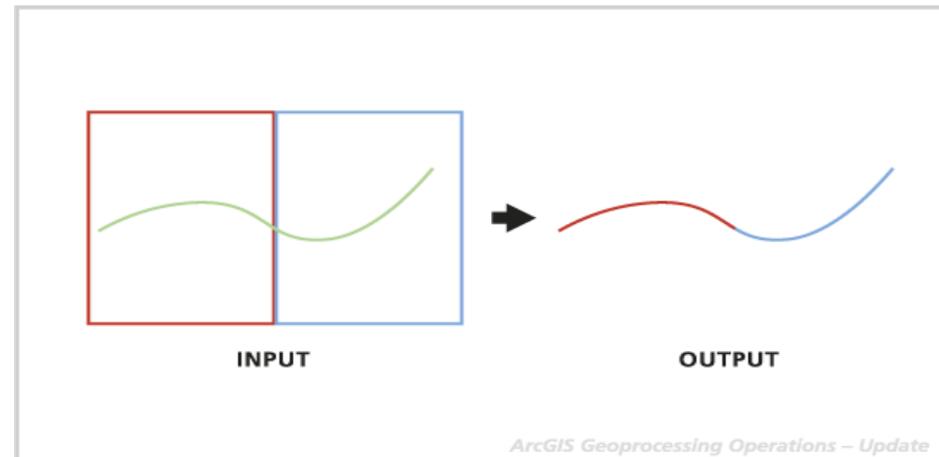
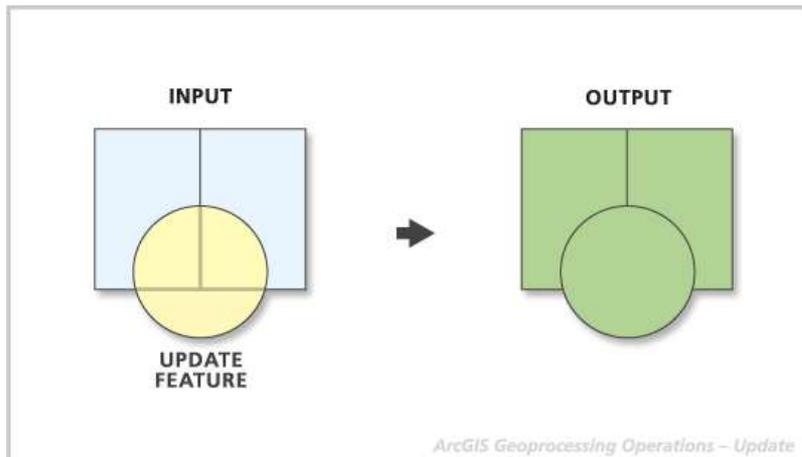
## 4- SPATIAL JOINS – UPDATE

If the input feature class or layer is a polygon, the update features are used to erase and then replace the input features.

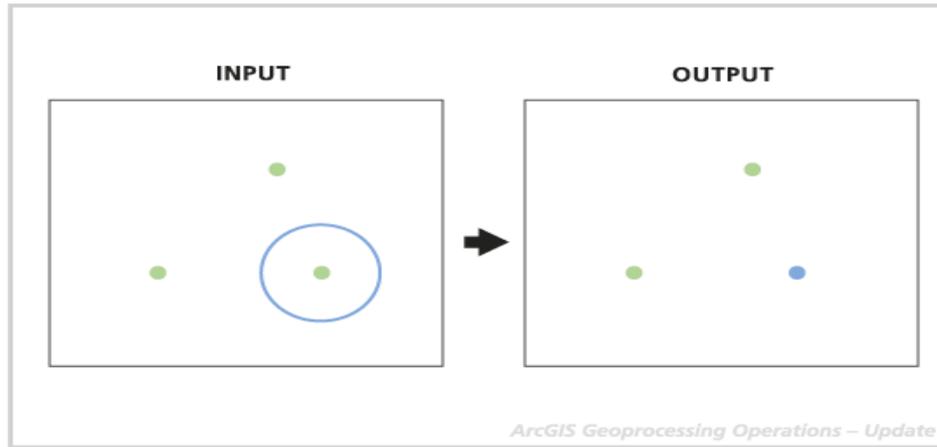
If the input is line or point, the features which overlaps an update feature will have it's attribute updated to match.

### UPDATE OF POLYGON FEATURES WITH POLYGON FEATURES

### UPDATE OF LINE FEATURES WITH POLYGON FEATURES



## UPDATE OF POINT FEATURES WITH POLYGON FEATURES



## TWO : PROXIMITY

The Proximity tools that are used to determine the proximity of spatial features within a feature or between two feature classes.

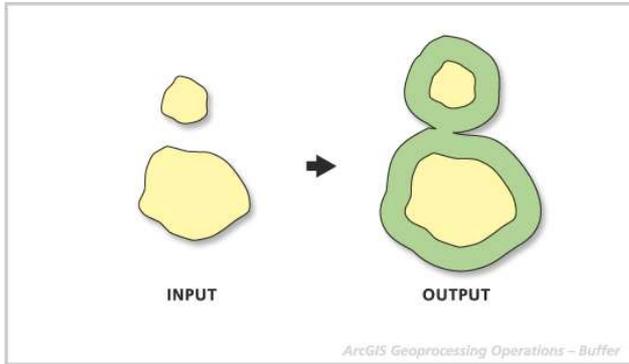
These tools can identify features:

- that are closest to one another
- and calculate the distances around them
- and calculate distances between them.

These tools can let you know events in an area, or find the area served by a facility or the features.

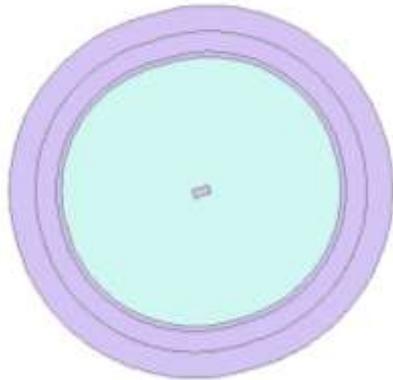
## 1- PROXIMITY – BUFFER

The area features by extending from point, line, or polygon features over a specified distance.



### SINGLE RING BUFFER

Create New class of Buffer feature Using a specific buffer distance

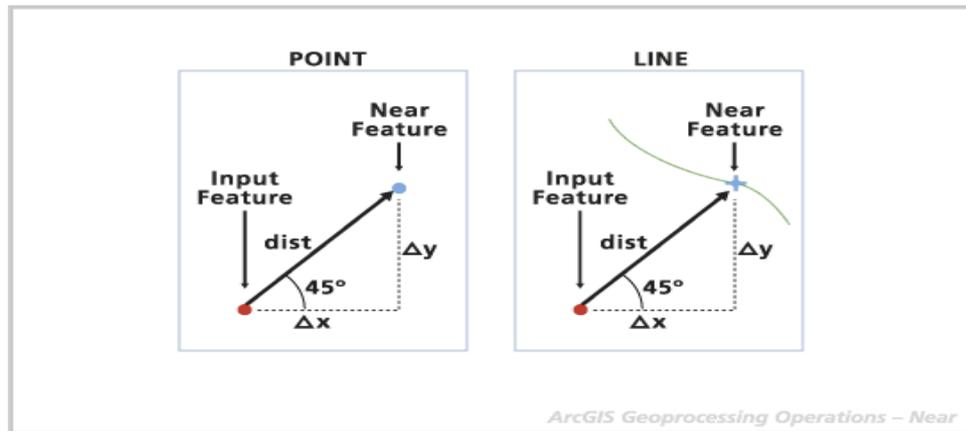


### MULTIPLE RING BUFFER

Creates a new feature class of buffer f using a set of buffer distances. The new features may be dissolved using the distance values

## B - PROXIMITY – NEAR

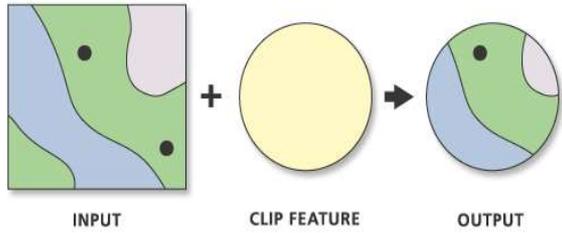
The Near tool computes the distance from each point in the input feature class or layer to the nearest point, or polyline, in the near feature class or layer, within the maximum search radius.



## THREE : FEATURE EXTRACTION

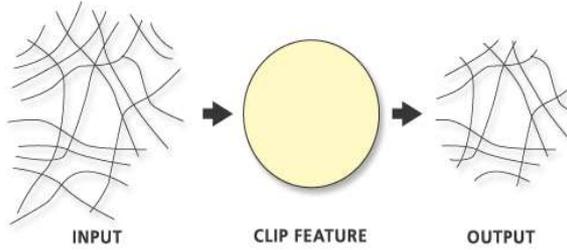
Extracts features from another feature that overlaps between them

- 1- CLIP : The feature shape that is having its features clipped can contain points, lines, or polygons, however, must be a polygon feature class , The attributes of the features in the output feature class are the same as those of the features been clipped. The attributes of the two inputs are not combined



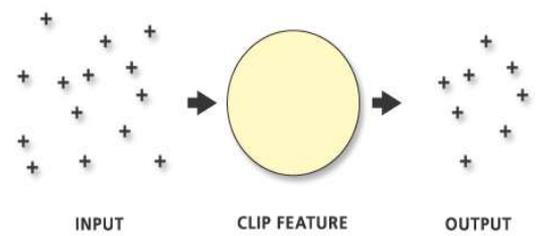
ArcGIS Geoprocessing Operations - Clip

Polygon features clipped by polygon features



ArcGIS Geoprocessing Operations - Clip - Line

Line features clipped by polygon features



ArcGIS Geoprocessing Operations - Clip - Point

Point features clipped by polygon features

2- **SPLIT** : creates new feature classes by overlaying two sets of features, The Split Field used to determine which polygons of the split feature class will be used to split the Input Features. The feature attribute tables for the output feature class contain the same items as the Input Features attribute tables.

Input Features can be polygons, lines, or points. Split Features must be polygons.



Output feature class features are of the same type as the Input Features.

ArcGIS Geoprocessing Operations - Split

3- ERASE : creates a new feature classes by overlaying two sets of features. They are clipped to the outer boundary of the Erase Features polygons. The attribute table for the output feature class contains the same items as the Input Features attribute table.



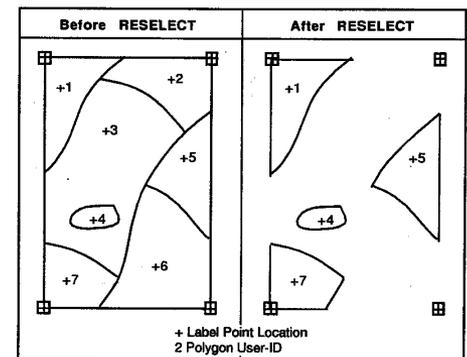
Input Features that are within the erasing region are removed.  
Input Features can be polygons, lines, or points

Erase Features must be polygons. The Erase Features polygons define the erasing region.

The output feature classes contain only those **Input Features** that are outside the erasing region

GIS Geoprocessing Operations – Erase

4 – SELECT : The Select tool extracts features from an input feature class or input feature layer and stores them in a new output feature class

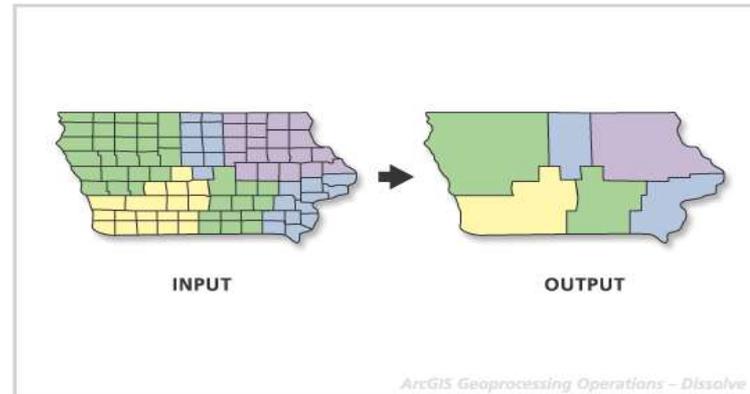


+ Label Point Location  
2 Polygon User-ID

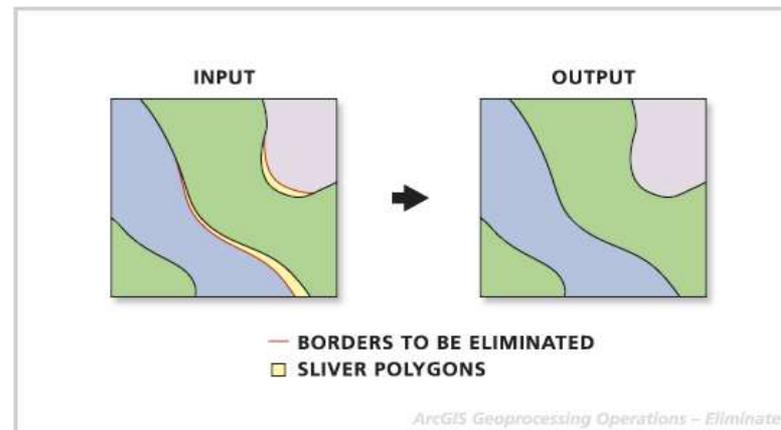
# FOUR: FEATURE MERGING

1- DISSOLVE : Used to merge features based on a specified attribute

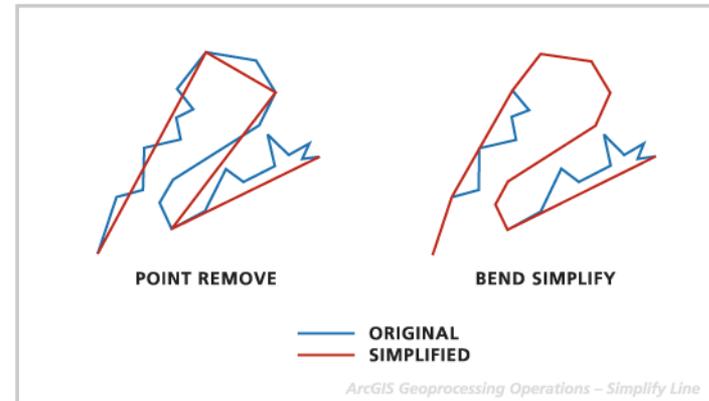
Typically, reduces the number of lines or polygons, thereby reducing the size of the data set



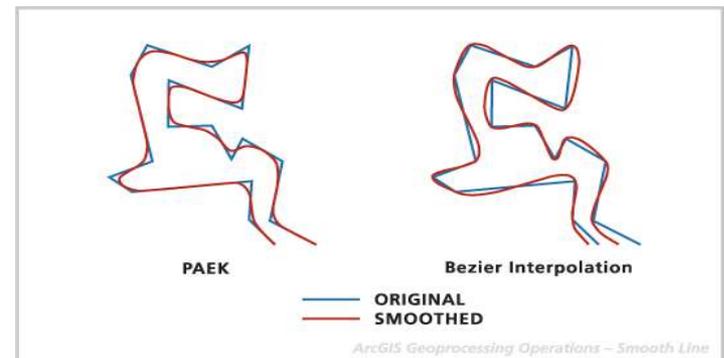
2- ELIMINATE : Merges the selected polygons with neighbouring polygons with the largest shared border, or with the largest area.



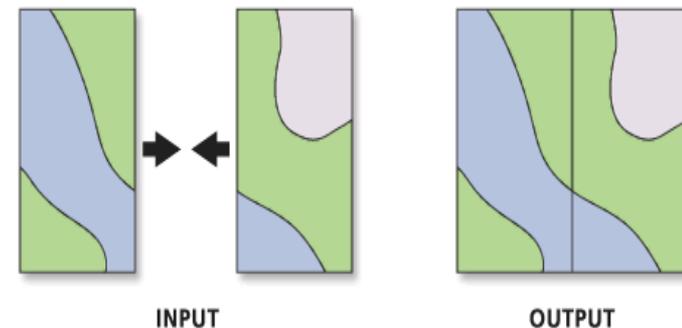
3 - SIMPLIFY LINE :Simplifies a line by removing small fluctuations or wrong bends from original line



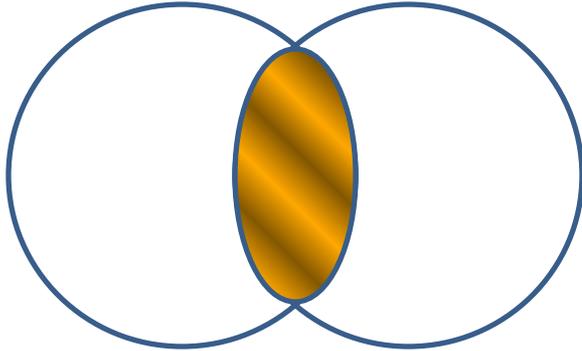
4- SMOOTH LINE :



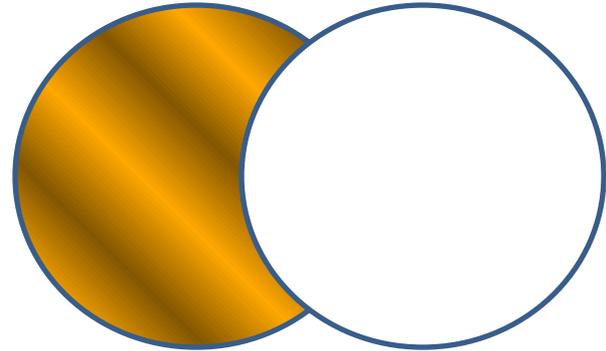
5- MERGE : Apply the features of two or more themes into a single theme. Attributes will be same if they have the same name . (polygons, lines, points)



**A and B**

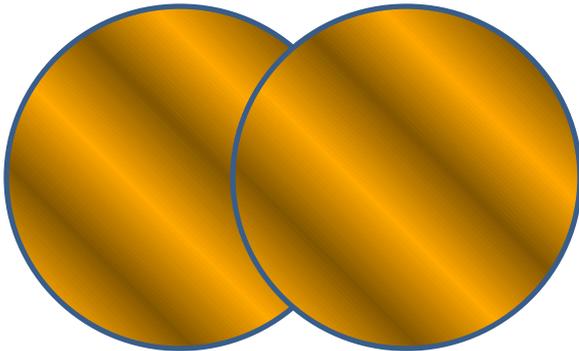


Logic **NOT**



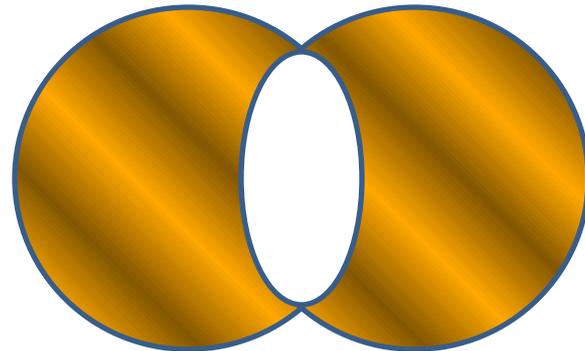
All of A, but NOT where B is

Logic **OR**



**A OR B**

Logic **XOR**



Either A or B, but not where  
Both exist together