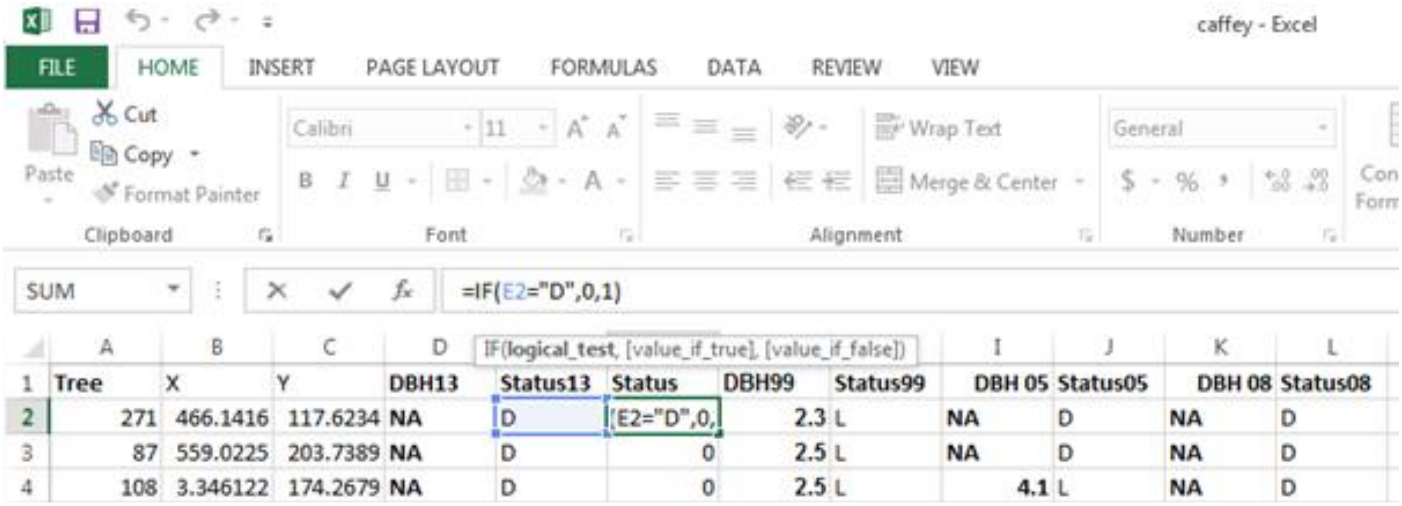
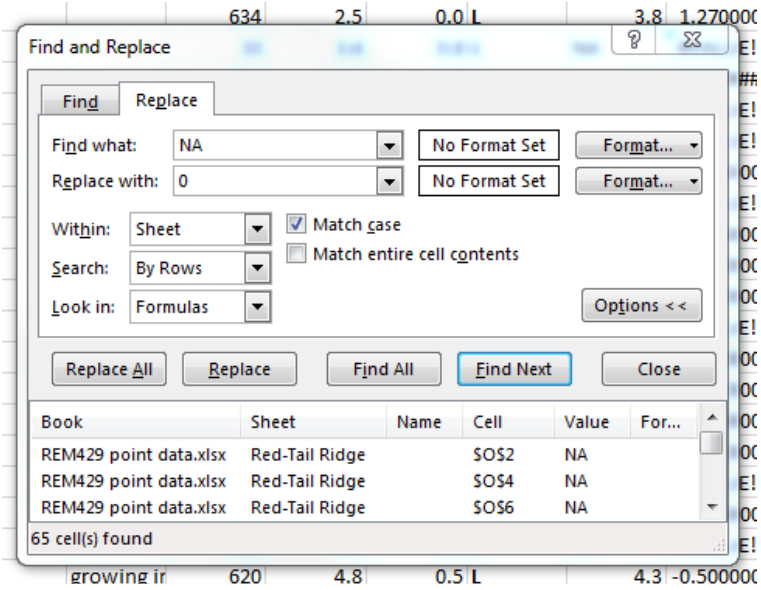
REM429 – Point pattern lab
ArcMap instructions

- To import from Excel to ArcMap first you need to re-format your data to make it as easy as possible for ArcMap to read. So first, copy your data to a new sheet in Excel and remove all your "problem" trees that can't be mapped for some reason. Then, you'll need to remove all text except your column headers since ArcMap will find it easiest to deal with numbers when mapping things. This means that you have to convert "Status", which is either "D" for dead or "L" for live into numbers. This can be done by creating a new column and adding a simple IF statement (after this dead trees will be 0 and live trees will be 1) of **=IF(cell="D",0,1)** where the first argument is a logic statement on the selected cell in your Status column, the second is the value if the logic statement is true, and the second is the value if the logic statement is false.

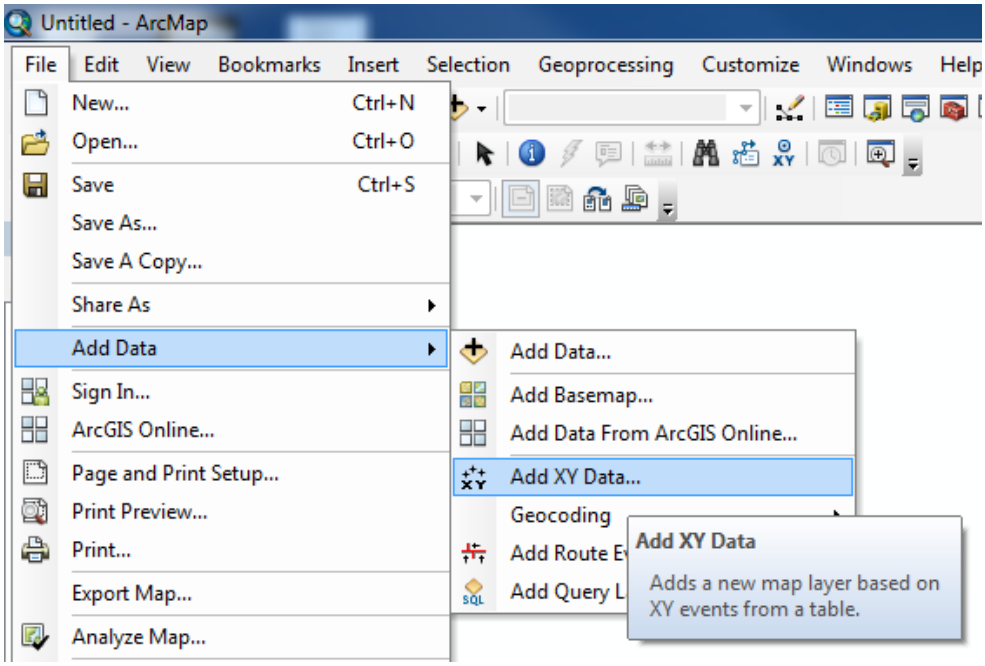


	A	B	C	D	E	F	G	H	I	J	K	L
1	Tree	X	Y	DBH13	Status13	Status	DBH99	Status99	DBH 05	Status05	DBH 08	Status08
2	271	466.1416	117.6234	NA	D	=IF(E2="D",0,	2.3	L	NA	D	NA	D
3	87	559.0225	203.7389	NA	D	0	2.5	L	NA	D	NA	D
4	108	3.346122	174.2679	NA	D	0	2.5	L	4.1	L	NA	D

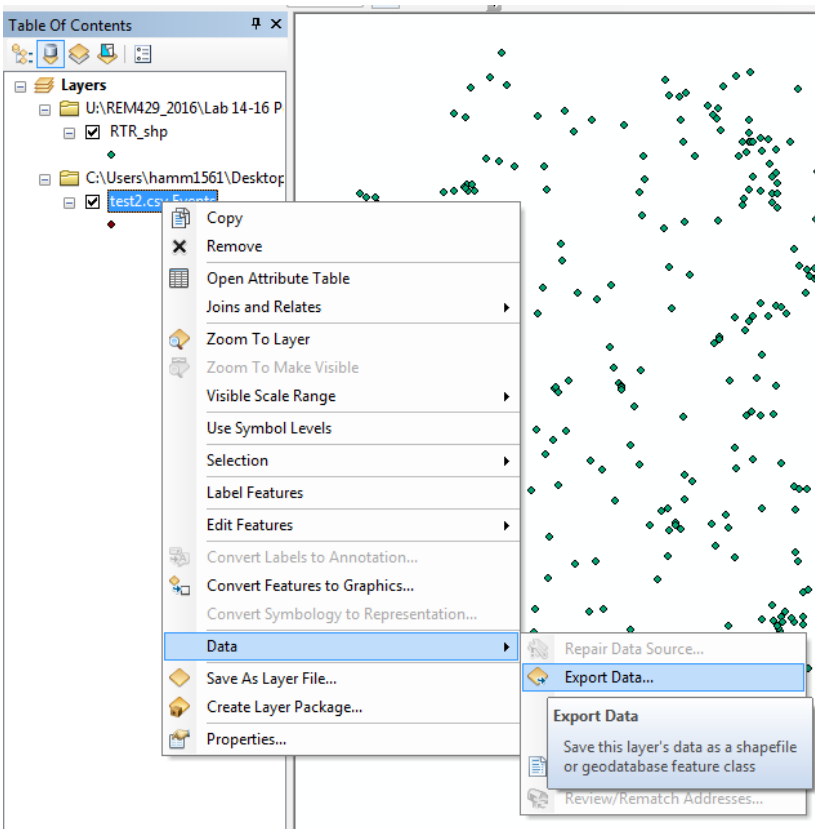
- Now, if you have any values in your DBH column that are text (for example if you put NA for DBH for trees that are dead) you need to also convert these to a number, I'd recommend 0 in this case as well. To do something like this you can use "Replace", which is under "Find and Select" on the far right in the Home tab in Excel. Here you can type in something like NA and then replace all of them automatically with 0.
- Also, make your column names as simple as possible with no spaces or characters, this will help you out later.
- Once you're **completely done editing**, open a whole new workbook in Excel and copy and paste over your data.
- Go to File > Save as > Save as type > CVS (Comma delimited) > Click yes or ok if it pops up warning you that formatting won't be saved.



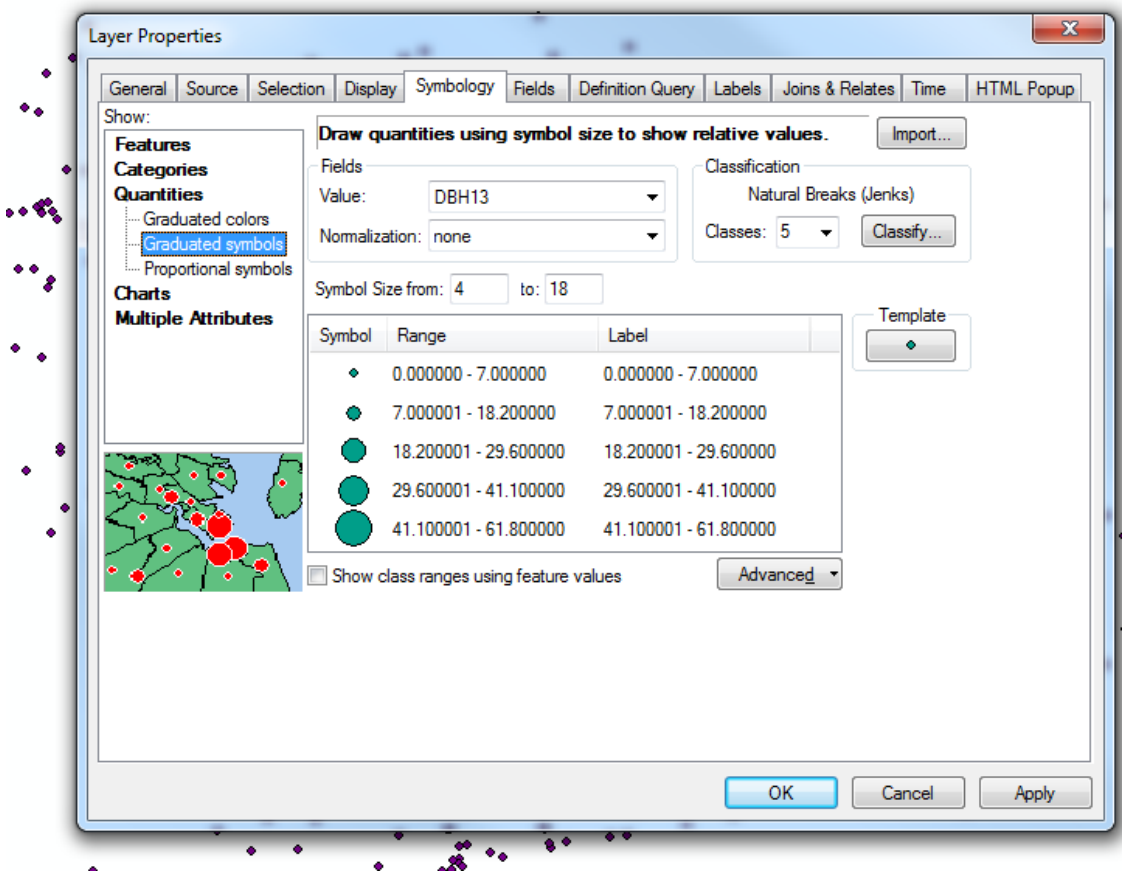
- Now you can import your data into ArcMap. When you select your CSV file it should automatically recognize your X and Y coordinate columns. When you first import it will give you a warning about Object-ID, we'll fix that later!



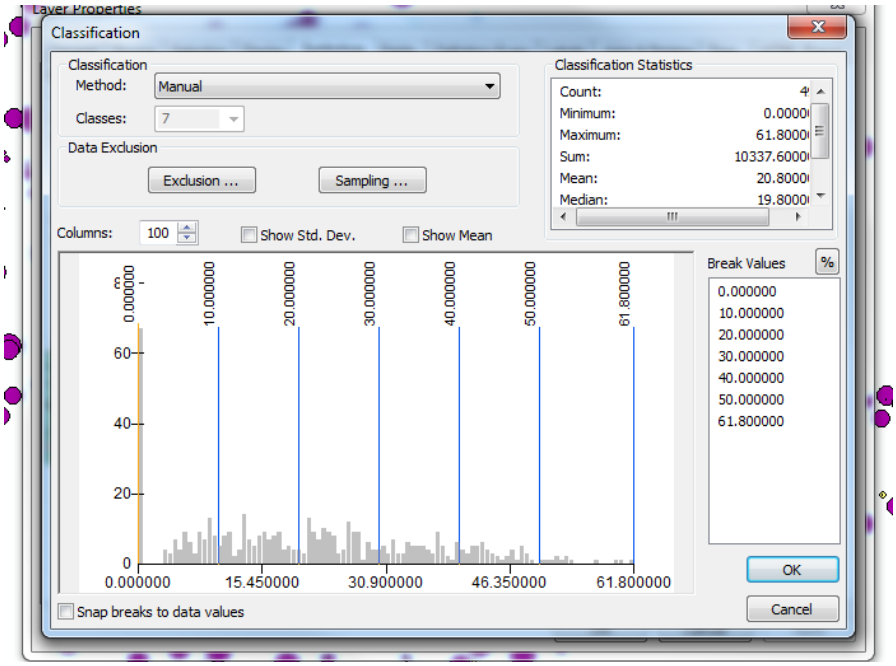
- To perform most analyses and manipulations you have to export it to a shapefile, right click on the data in your Table of Contents and go to "Data". Go to "Export Data" and be sure to browse to where you want to save your file. Choose "shapefile" from the dropdown menu "Save as type" once you've browsed to the correct folder and named your new layer.



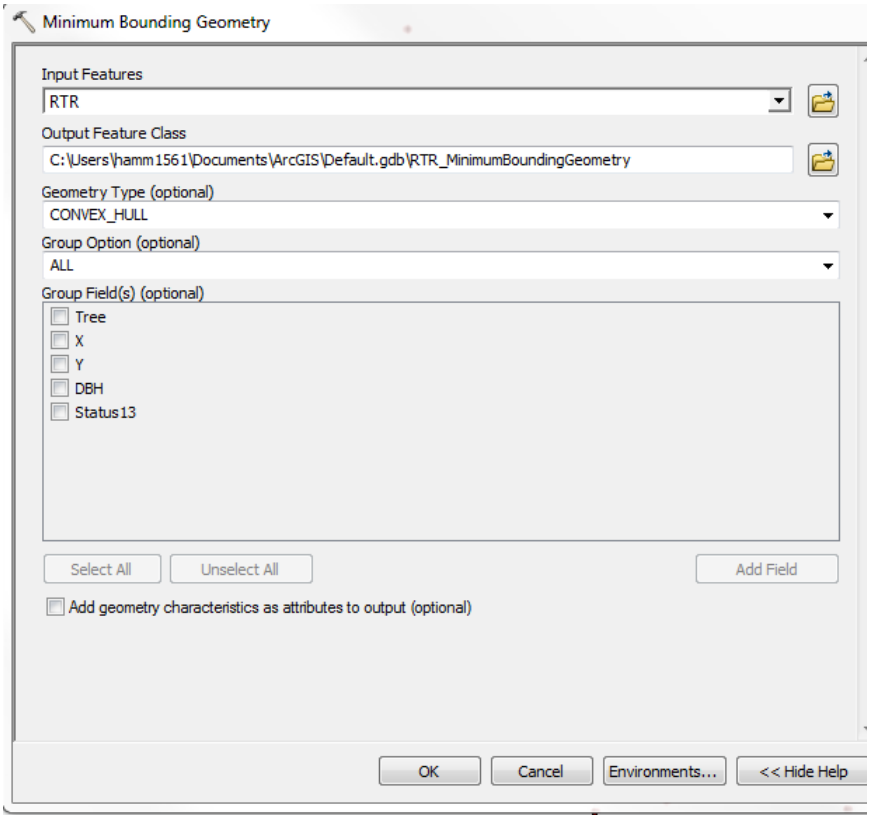
- Now you can create a stem map with interesting information, for example you can do the size of the circles as proportional to the DBH of a tree. To do this, right click on your data layer and go to “Properties” > “Symbology” > “Quantities” > Graduated Symbols.



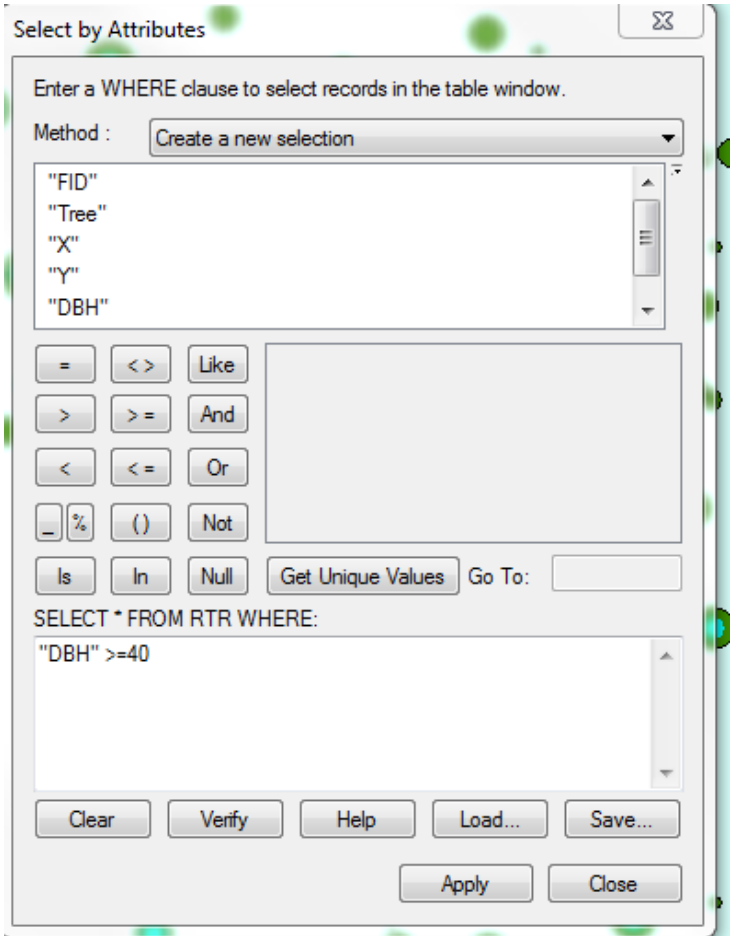
- ArcMap will automatically create “natural” breaks but you can specify our own by clicking “Classify”. HINT: start by leaving it as “natural breaks” and simply selecting 9 classes. Then you can change the breaks by either manually moving the lines or by typing in values on the right-hand side and you can delete any extra “breaks”.

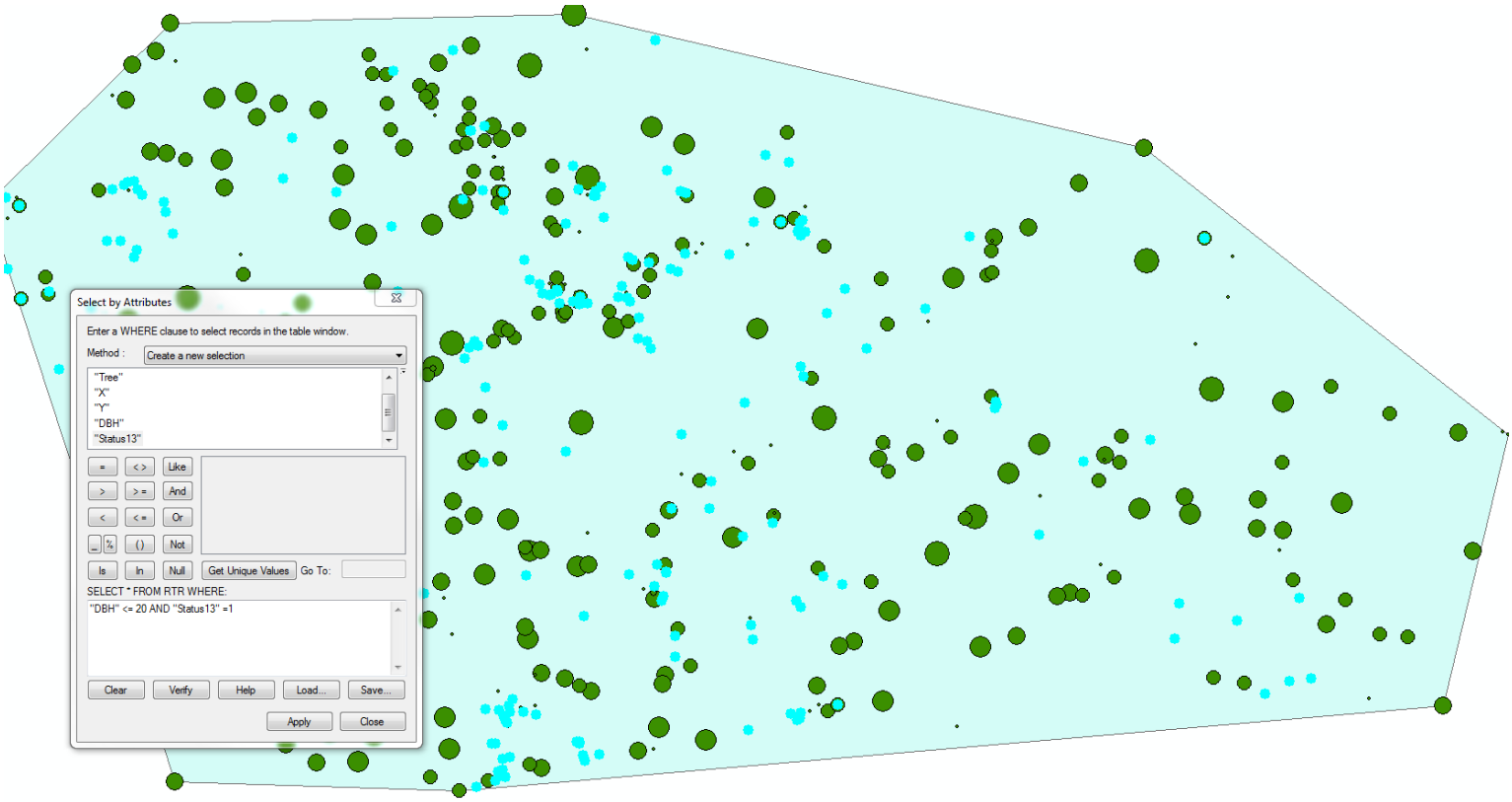


- We also want to try running Ripley's K on these data, but first you have to create a new shapefile that is the "minimum bounding area". This creates a shapefile with the minimum geometry that contains all the points, which is what we want in order to ensure that there are no artificially empty spaces in our analysis area caused by the fact that our area is not a perfect rectangle. To create this shapefile, to "Data Management Tools" > "Features" > Minimum Bounding Geometry. Your Input Feature is your point pattern shapefile and the Geometry Type that you want to use is "convex hull". Make sure that the output is saving to the correct folder under Output Feature Class and then leave everything else at default.



- Now you're almost ready to go in and run Ripley's K, make sure that "Spatial Analyst" is clicked under the menu "Customize" > "Extensions"! First, however, you need to select some meaningful subset of the data to run the analysis on (simply running it on all the points isn't super exciting). To do this open the attribute table of your point pattern data and do "Select by Attribute". Then you can type in a logic statement to select things like only live, small trees ("DBH"<=10 AND "Status"=1) or things like only dead trees ("Status"=1).





- Once you make that selection go to the Toolbox and “Spatial Statistics Tools” > “Analyzing Patterns” > “Multi-Distance Spatial Cluster Analysis (Ripleys K Function)”
    - The Input is your point pattern
    - Select 99 permutations
    - Click “Display results”
    - Choose “User defined study area”
    - Select your minimum bounding geometry shapefile you made earlier