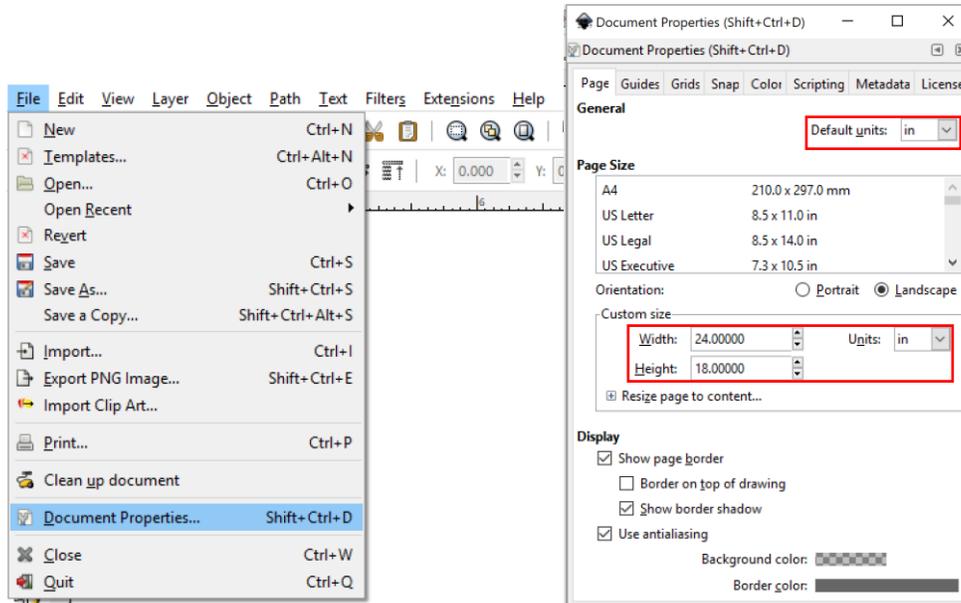
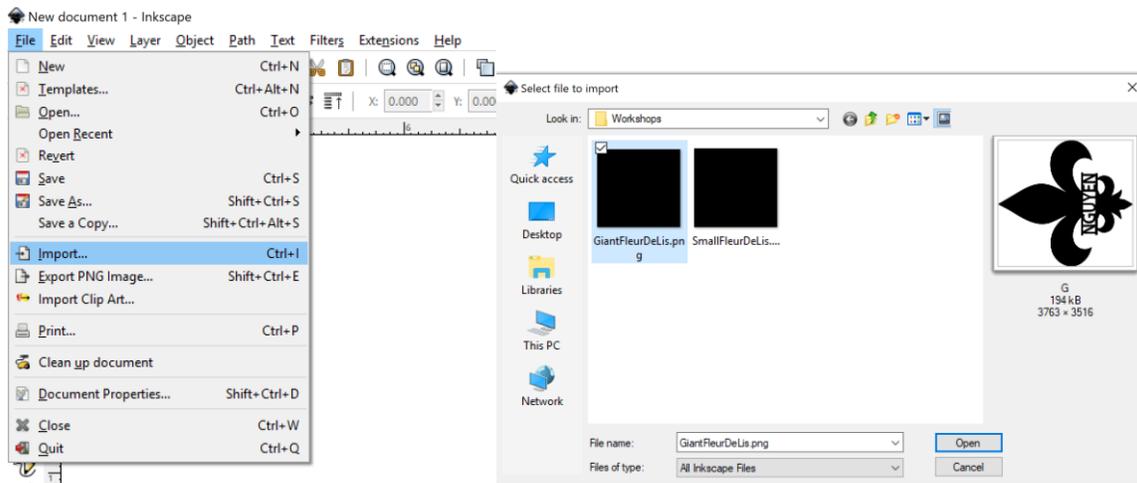


## Laser-Cutting Workshop

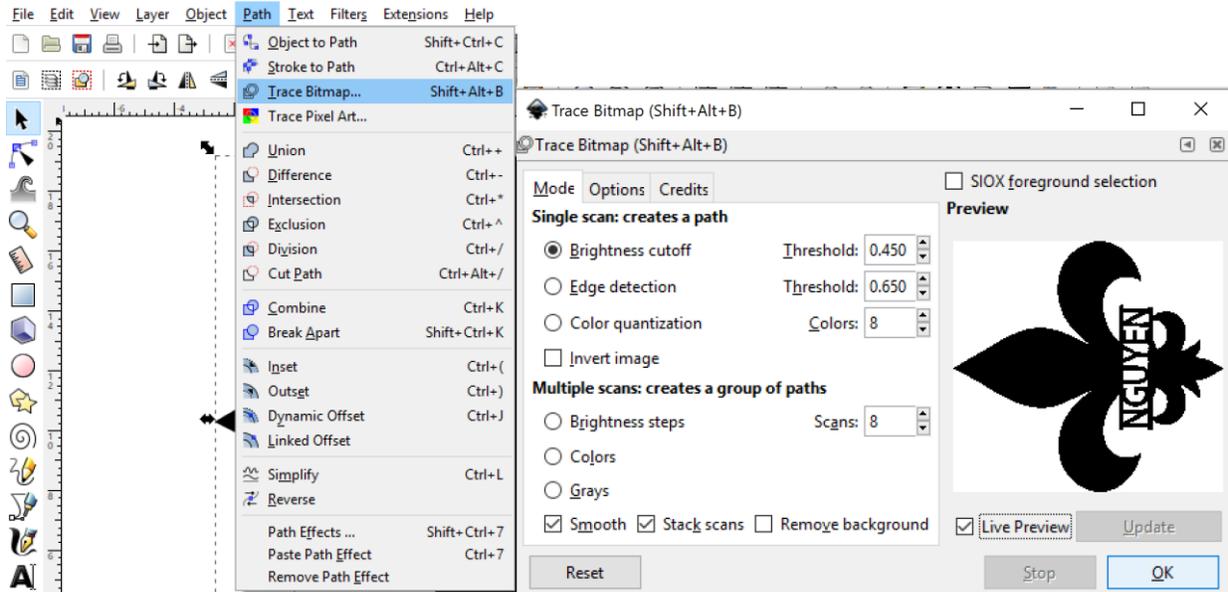
1. First thing we want to do is to change the document size to fit the size of the laser-cutter bed by going to document properties as shown below. We do this so that it's easier for us to orient our design on the bed of the laser cutter.



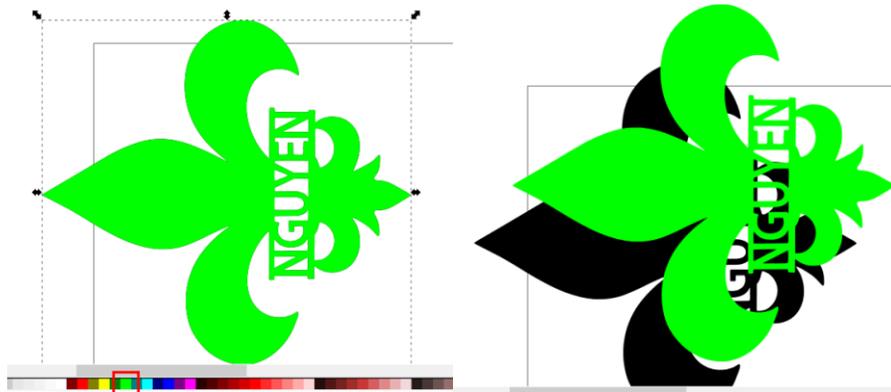
2. Now insert the image you want to use for this tutorial, either through the import menu (as shown below) or by pasting it from your clipboard.



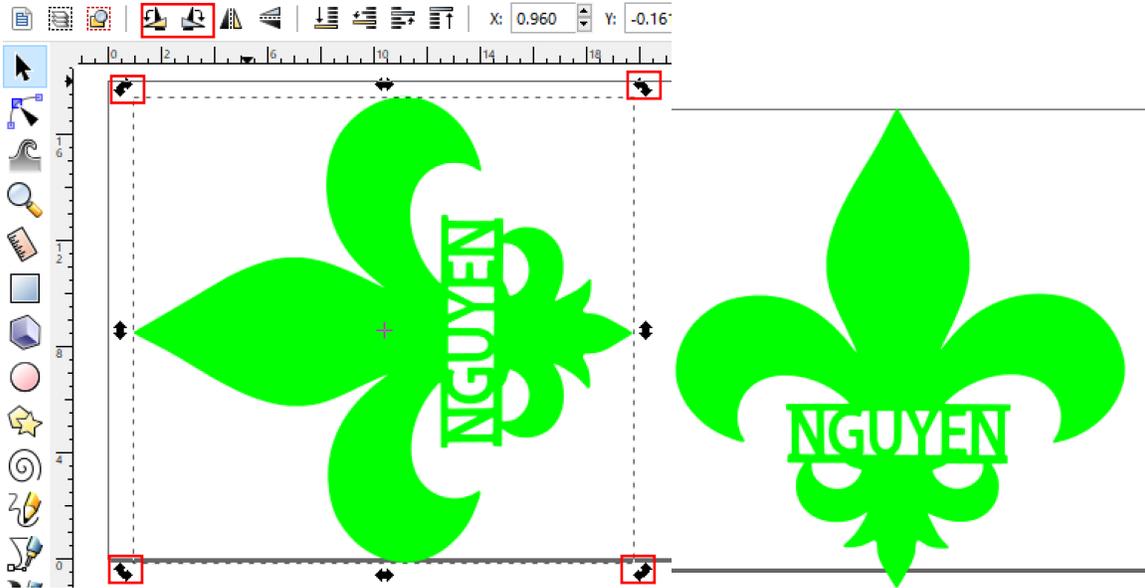
3. We want to turn the bitmap into a vector so that the laser knows how to trace out the fleur de lis. Thus, we are going to vectorize the image via "Trace Bitmap". Since the image we're using has high contrast, it is very easy for our function to detect the edges, so the default settings work for this case. You would need to play with the settings a bit in those cases where the picture doesn't have as much contrast. Press "ok" and close the "Trace Bitmap" window.



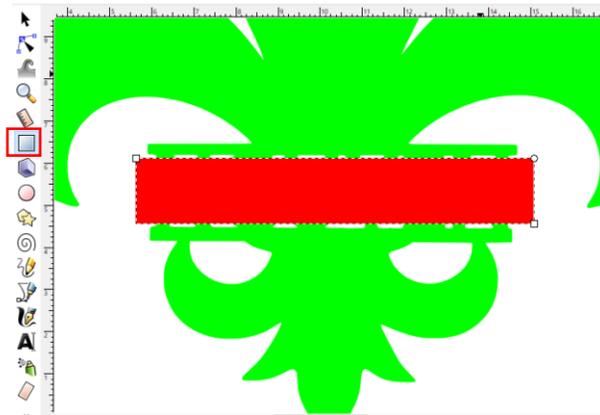
- Now you will have a vector version of your image lying on top of your image. To make it easier to tell the difference, we'll set the vector's fill to green to contrast it with the original black image. You'll see that when you move the vector, the original bitmap is still there. Move the vector out of the way and delete the old image.



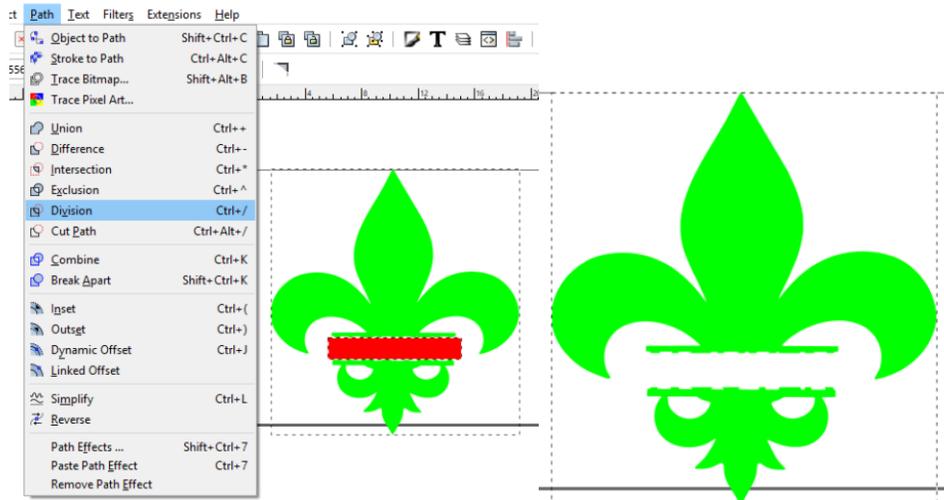
- To make things easier for us to work with, we are going to want to rotate our new vector. We can do this in one of two ways. First, we can just press the rotate 90° CW or CCW buttons. We can also click on the vector twice to reveal the rotation handles. We can rotate the vector by dragging those handles around.



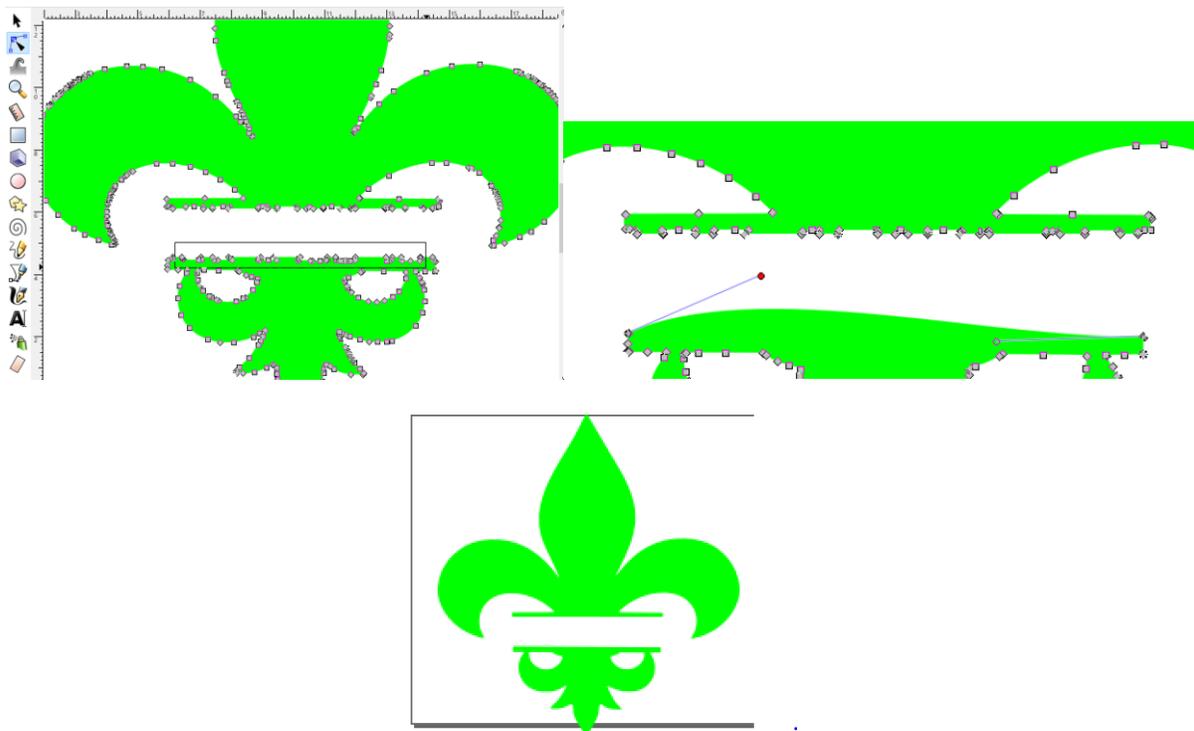
6. Unless your last name is Nguyen, you are probably wondering how you can change the name in the middle of fleur de lis. Select the rectangle tool and use it to create a rectangle to block out the part you don't want. I've set it to have a red fill so it is easier to see.



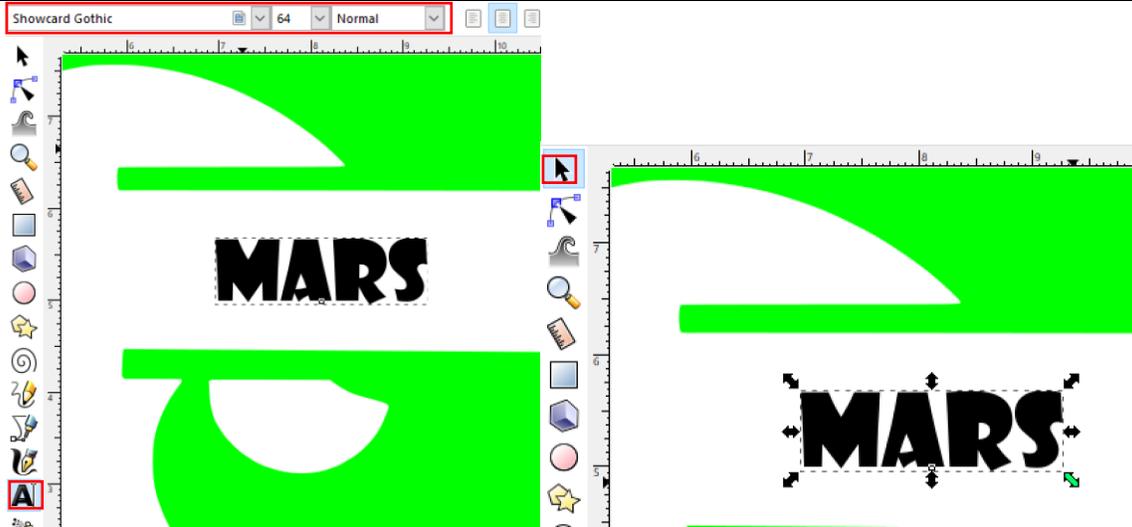
7. Now select both the rectangle and the fleur de lis by shift + clicking each, and then go to the path menu and select difference as shown. If you selected division, you can actually split the fleur de lis into multiple parts rather than deleting one part of it. You should end up with the object on the right.



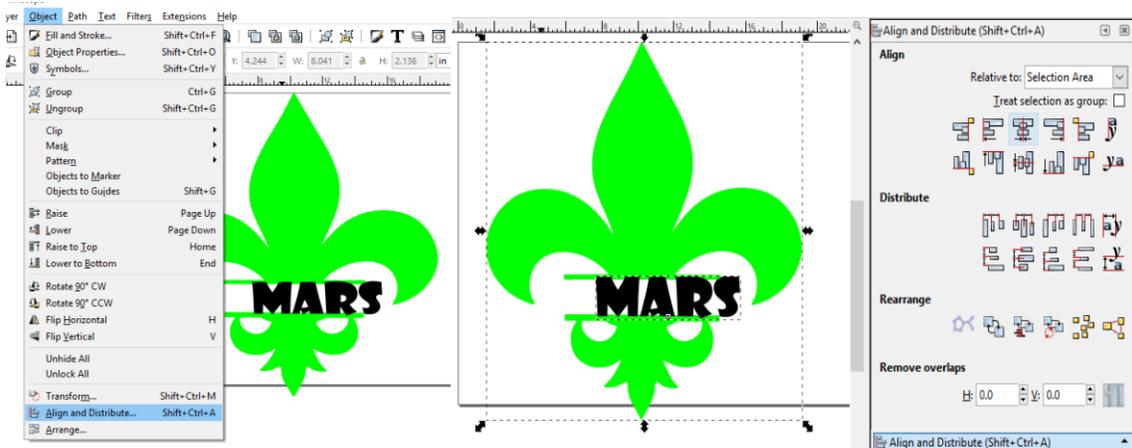
- Now we want to clean up the fleur de lis a little bit. Select the node tool as shown and use it to select the uneven bits of the fleur de lis and delete them using the backspace. The line at the bottom part will be a little wavy, so select the handle (highlighted in red) and drag it so that it is over the node it is originating from. Do that for both sides, and you will see the border is now a straight line. Repeat for the top part.



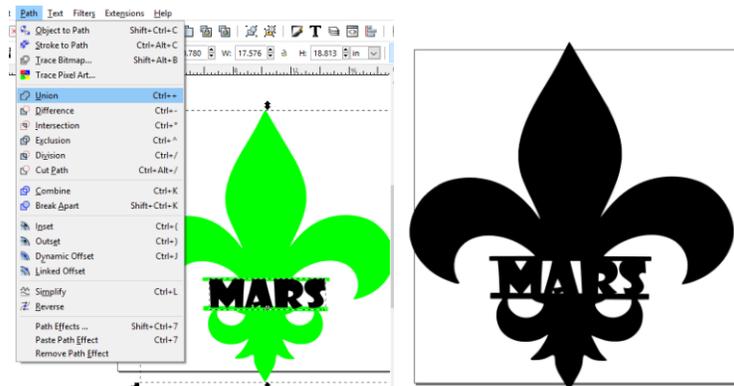
- Now we want to add your name into the fleur de lis. Using the text tool (shown below) type in your desired name and select a font that makes you happy. I recommend having your name in all caps to make the fleur de lis look a little more even. Select the selector tool to reveal the resizing handles for your text and resize it as necessary. If you want to keep the same proportions while resizing, hold down **ctrl** to keep the sizing proportionate



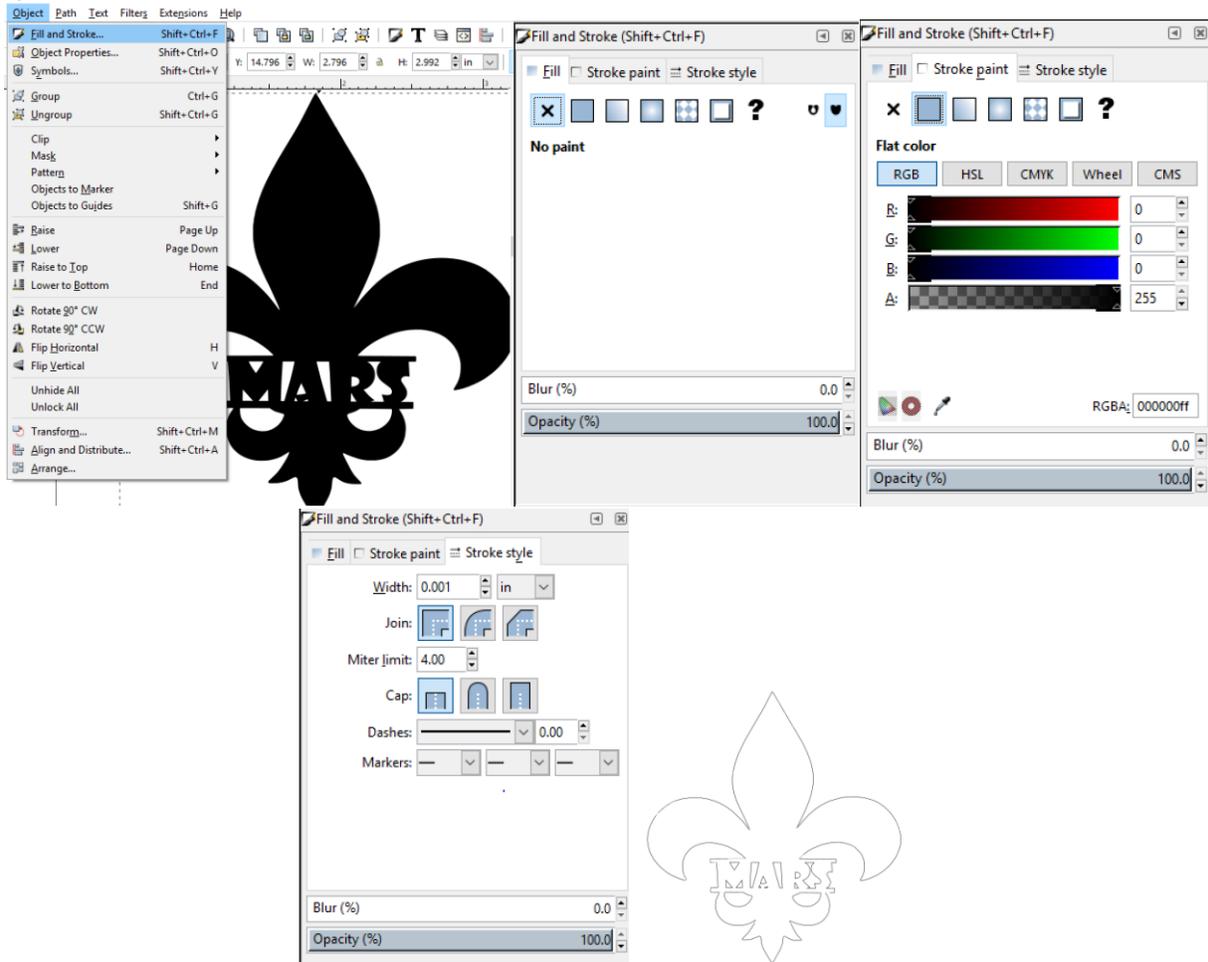
10. Once you are done resizing your text, move it to about where you want it to be located on the fleur de lis. Go to the “Object” tab and select “Align and Distribute”. Select both the fleur de lis and your text. Click on the “center on vertical axis” option to center your text.



11. Finally, select both objects and go to the “Union” option under the “Path” tab. Voila. Your name and the fleur de lis are now one. I’ve changed the fill to black because I was getting tired of the green.

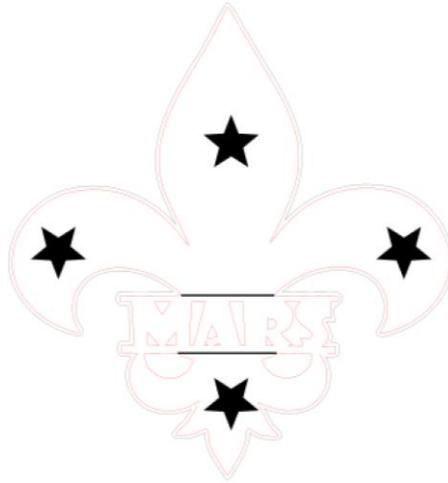


12. Now resize it to the desired size and shape. Go to the “Object” tab and select “Fill and Stroke” to prep your design for laser cutting. For this design, we are turning the fill **off** so that the laser doesn’t burn in our design and turn the stroke **on** at a width of **0.001 in** to signal that we want the laser to follow the outline of the vector. From there, you can add little designs and to your fleur de lis and customize it how you like. Remember that having a fill (or a stroke > 0.001 in in width) will set the laser to raster/engrave that part. Feel free to play around and add little stars and designs to your piece.



13. Finally, once you are satisfied with all of your settings and your placement of your design, the final step is to load it onto the laser-cutter. You **CANNOT** print directly from Inkscape. You need to export your svg as a pdf and print from there. If you need help, please ask.

14. Bonus: You can also set different vectors to different colors. If you enable color mapping when you go to laser cut your design, you can change the power, speed, and frequency settings for each individual color. What this means is that you can set a certain color (in this case red) to be at only half power and half speed. Thus, the laser would trace out the red vectors but will not burn all the way through. This makes for cleaner lines as well as faster cutting times. The final vector below, for example, will raster/engrave the dark black lines (line width > 0.001 in) and the stars, vector out the red line based on the red settings, and vector out the black line according to the default settings.



15. Extra Bonus: Using what you've learned from this workshop, pick a picture you like and try to convert it into a decoration with your name. If you need any help, let us know. One example is what I made for my brother:

