

EXAM 2 – Computer PORTION

Name _____

If you get a plot working, call me over to check off that it is working correctly. You can wait until the end and check off just Part c and if it is correct that will count for parts a and b also.

Part a (1 pts) _____

Part b (3 pts) _____

Part c (2 pts) _____

For this exam, you will create TWO m-files. A main program called `lastname_firstname.m` (all lower case) and a function called `lastname_transform.m` (all lower case). The header section of your code should include your name, section number, and CM number; you do not need to do any other commenting. There should be no output other than what is requested.

When you are done, put both of your m-files in the Moodle dropbox.

Problem (60 pts)

(a) (10 points) Read in the data from the spreadsheet `Picture.xlsx` found on the course website. The first column is x-coordinates for a set of points and the second column is the y-coordinates. Plot the points using red 'x' symbols. Add the command `axis equal` to your script after you plot, so that the picture looks good.

(b) (30 points) We will now create a function to shift and rotate the points. The inputs to the function are the original x and y coordinate vectors, as well as the `x_shift`, `y_shift`, and rotation angle. The outputs to the function are the transformed x and y coordinate vectors:

```
function [x_trans,y_trans]=lastname_transform(x_orig,y_orig,x_shift,y_shift,rotation_angle);
```

The equations to transform the points should be:

$$\begin{aligned}x_{trans} &= x_{orig} \sin \alpha + y_{orig} \cos \alpha + x_{shift} \\y_{trans} &= -x_{orig} \cos \alpha + y_{orig} \sin \alpha + y_{shift}\end{aligned}$$

where α is the rotation angle.

Call your function from your main program with

```
x_shift=20;
```

```
y_shift=20;
```

```
rotation_angle=45; (notice that this is in degrees)
```

then plot the transformed points on the same figure (as for part a) using green 'x' symbols.

(OVER)

(c) (20 points) Add a while loop to your program to keep shifting, rotating, and plotting so long as the maximum x in the transformed vectors is less than 100. Increase the `x_shift` by 20, the `y_shift` by 20, and the `rotation_angle` by 45 degrees each time you go through the loop. Use green 'x' symbols for the plot.