

Name: _____ SECTION: _____

Submit the .m file at the end of the time allocated, on canvas under link for Practice Exam1.

RETURN COVER SHEET BEFORE LEAVING.

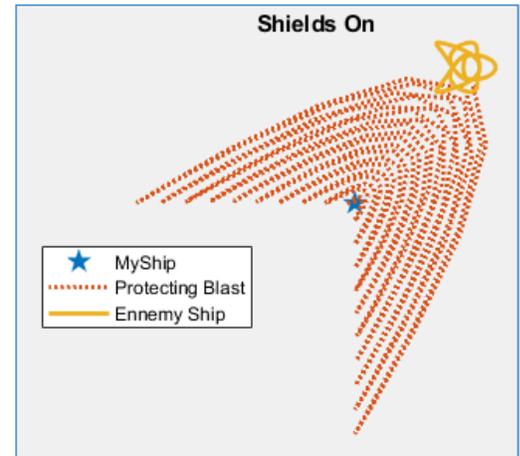
To expedite grading, circle your best estimate: 90+ or not ?

*If you don't like the story, make up your own but do the work expected regardless. 😊

Your ship has spotted an enemy ship on your radar. The x_{enemy} and y_{enemy} location of the enemy is known as well as its size (k_{size}). You have turned your protecting blast/shield ON but need to determine the proper angle (β) to aim it towards the enemy, and adjust its power setting (k_{power}) so that it reaches the border of the enemy.

(5pts) Engineering Process - Step1:

*Note that all these values should be able to be changed easily in the code.



Step2: not applicable.

Step3: To plot the enemy, plot y vs. x with the following parametric equations: θ being a range of angles from 0 to 7 radians.

$$x(\theta) = k_{size} * (\cos(4\theta) - \cos(3\theta)^3) + x_{enemy}$$

$$y(\theta) = k_{size} * (\sin(4\theta) - \sin(2\theta)^3) + y_{enemy}$$

To plot the blast/shield, plot y vs. x with the following parametric equations: t being a range of values from 0 to 20π .

$$x(t) = k_{power} * t * (\cos(2t) * \cos(\beta) - \sin(t) * \sin(\beta))$$

$$y(t) = k_{power} * t * (\cos(2t) * \sin(\beta) + \sin(t) * \cos(\beta))$$

Your ship is simply located at coordinates (0,0).

Step4: no assumptions would simplify any of these equations!

Step5 and 6: not applicable.

Steps7a and b must be in the script, as done in class (filename up to you). Step 7c) is not applicable here as the result is visual. The figure of your code must overall match the figure shown: use line types and colors of your choice. The star is simply done using the pentagram marker. To place the legend in the best location, the fourth argument must be the string 'location', and the fifth argument must be the string 'best'. Assume the axis to be set to equal.

Test/Fill in the table below by re-using your code:

| x_{enemy} | y_{enemy} | k_{size} | k_{power} | β (degrees) |
|-------------|-------------|------------|-------------|-------------------|
| 4000 | 5000 | 600 | 98 | 45 |
| -40000 | -60000 | 6000 | | |

Overall heads up: Some data is in radians, other in degrees. Be careful.

The rubric and extra credit is on the back page. Use it as a check list before submitting.

Extra Credit 1

No credit if the rest of the code is not complete and functioning: Since the location of the ship is known, use the `angle()` function to automatically calculate the angle (β) at which to set the shield to. Move your LOC around to make it work! In that case, omit the semicolon on the angle calculation. If you cannot make it work, revert it back to hardcoding a value. Still no 7c).

Extra Credit 2

Estimate how many lines of code the code behind Google has.

| | | |
|--------------------------------------|-----------|---|
| Complete intro | 4pts | |
| Proper clean-up commands | 2pts each | |
| Comments | 5pts | |
| Proper and Consistent Spacing | 5pts | |
| Proper variable names | 5pts | |
| Semi-colons | 5pts | |
| Does code run? | 5pts | (I want a code that runs. Comment out what does not!) |
| Define data for enemy | 5pts | |
| Equations for enemy | 15pts | |
| Define data for blast/shield | 5pts | |
| Equations for blast/shield | 15pts | |
| Proper use of element-per-element | 5pts | |
| Plotting my position | 5pts | |
| Plotting shield | 5pts | |
| Plotting enemy | 5pts | |
| Line types | 5pts | |
| Title | 2pts | |
| Proper axis command | 4pts | |
| Proper legend, with correct location | 6pts | |
| Table filled in | 5pts | |
| Leeway in grading | 8pts | |