ENME303, Fall 2021 (T.Wu)

Assignment Week11

Linear Transformation (120 pts)

Problem	1	2
Points	(60)	(60)

The entire assignment is in MATLAB, and it serves both as a homework and lab work. Only print when the prompt requests. Extra printing will loose points. Remove the unnecessary code in the script.

One problem per section, so the script shall have 2 sections (no more, no less). Name your m script to `LastName_FristName_lab11.m`

Bottom line: Considering the fact that 4 TAs need to go over 100+ scripts, for those who create extra grading burden for the TA, Dr. Wu will take extra points off from their HW.

1. Use the `lab11_template.m` as a template to shear an image (e46.png or retriever.png, up to you). Do not change the variable names in the template.

   (a) Shear the image in the x-direction by 1. And then write the sheared image to `YourNameInitial_Lab11_shear1.png`.

   (b) Shear the original image in the y-direction by 2. And then write the sheared image to `YourNameInitial_Lab11_shear2.png`.

2. Let vector $u = [10 \;\; 6]^\mathsf{T}$, $v = [3 \;\; 3]^\mathsf{T}$ and $w = u + v$. This problem has no template, start your own code from scratch.

   (a) Reflect u horizontally to u', and then reflect u' vertically to u''. The operation is exactly same as shown in Fig. 1.
   (Thought: In fact, if your do the vertical reflection first and then the horizontal reflection, will the result be different?)

   (b) Assign the value of u'' to variable name `out`. Use the `dispaly()` to display `out`.
   Hint: The u'' can be found by inspection. What the grader looking for is the proper way to operate matrix transform

   (c) Reflect v horizontally to v'

   (d) Let $w'' = u' + v'$ and assign w'' to the variable `out1`.

   (e) Reflect w horizontally to w', and then assign w' to the variable `out2`.

(f) Show that `out1` is equal to `out2` by using a new variable called `compare`.

```
compare = out1-out2;
display(compare)
```

(Thought: Why are they equal? Are they equal by chance or by destiny?)

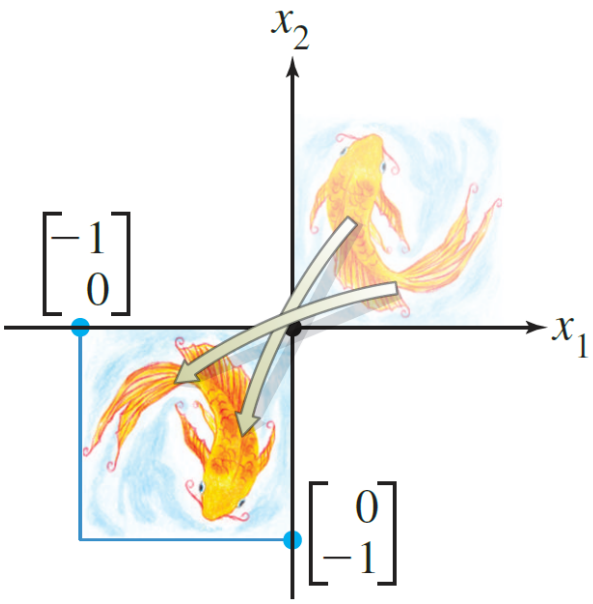

Figure 1: Reflection transformation

Deliverable Please do not zip the files. Just submit 3 files as is:

1. `LastName_FristName_lab11.m`
2. `YourNameInitial_Lab11_shear1.png`
3. `YourNameInitial_Lab11_shear2.png`

Reminder

- If the shear images do not match the code submitted, a zero will be assigned to the entire assignment.
- Add your name and UMBC student ID at the beginning of your script.

```
#*-------------------------------
#* Author:       Ragnar Lothbrok
#* Student ID:   UMBC-ID-9999
#* Description: Design a raid route from Kattegat to
   England
#*-------------------------------
```

- All of assignments must be submitted to Blackboard (no exceptions, even for late submissions). Each assignment allows 2 attempts. Review your script before making submissions.
- Comments are intended for anyone who is likely to consume your source code. Proper commenting is a reasonable way to go about explaining to yourself and other programmers what the code is doing. Points will be deducted if you fail to put proper explanation in the code.