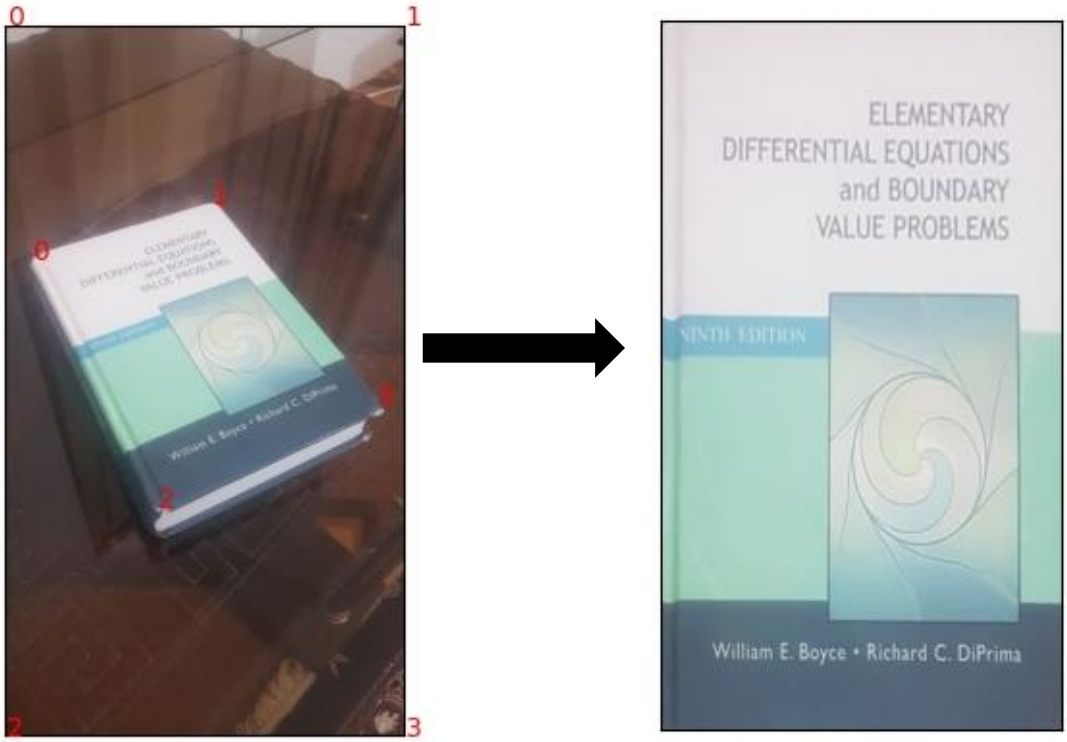
1928 K. N. Toosi University of Technology	*In the name of God* **Computer Vision**	Faculty of mechanical engineering
Instructor: Dr. Esmaeil Najafi	Assignment 1	Due date: 01/01/19

1-Build your own Cam Scanner!

Given a picture of a book or paper:

- Take the coordinates of four corners of the object of interest as the input (source points).
- Use the corners of the input image as the destination points.
- Find the Homography between source and destination points.
- Warp the input image with the Homography matrix and save it as the output of your code.
- You should test your code on at least 4 different images.

Example:



2- A quarter of a circle with the radius of 5 cm is given. Based on what you have learned so far:

- Find the coordinates of the center of the area of this object in the image space.
- Find the coordinates of the centroid in real world coordinates.
- Use analytical solution for finding the centroid and verify your answer.

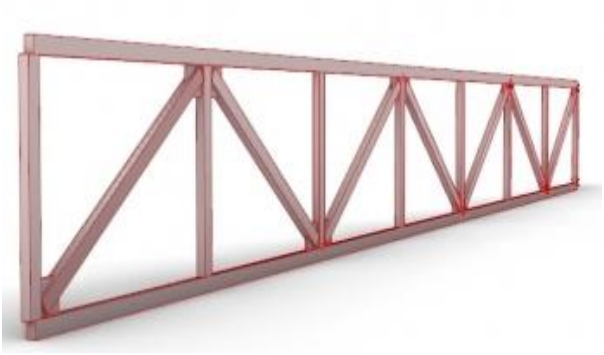
Do not use libraries for calculation of the centroid.

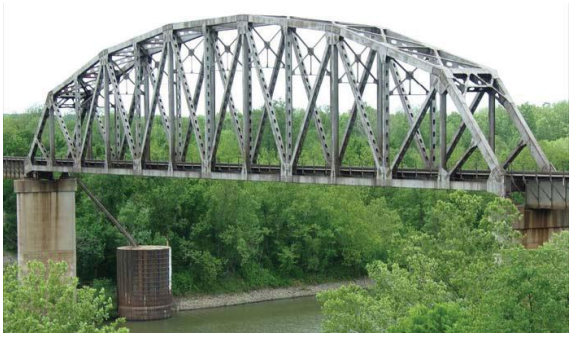
3- Extract HOG features from three given images and calculate the L2 distance between these three images. Can you find a rule for distinguishing cat images from dog images? Check your answer by finding three random cat and three random dog images from the internet and decide based on the obtained rule.

4- Given two images of trusses, find the edges in the images with:

- SobelX
- SobelY
- Laplacian
- LoG (Laplacian of Gaussian)
- DoG (Difference of Gaussian)
- Canny edge detector
    - Try to find the best threshold by changing the threshold.

Compare and discuss the obtained results for these images.





5- Remove the background from the KNTU logo, then place it at the middle of the other image.

6- Find the similar points in the two below images with SIFT, and match them.

7- X-ray images are usually associated with unwanted noise. Based on your knowledge, denoise this image with suitable filters and compare the filtered images together.

Good Luck