Exercise:

We all know that *sometimes* you get bored during the lectures. However, this is not the case for Cem Hoca's classe, of course. Anyway, let us assume that you lost your attention in Scientific Computing class and decided to draw something on your notebook (we hope you have a notebook at least). You started with a point and drew a line to another point, and from this second point you drew another line to a third point. This continued until the Kth point, then you connected the first and K^{th} points and obtained a **random polygon**. To clarify, this drawing turned out to be something like in *Figure-2* if K is 10.
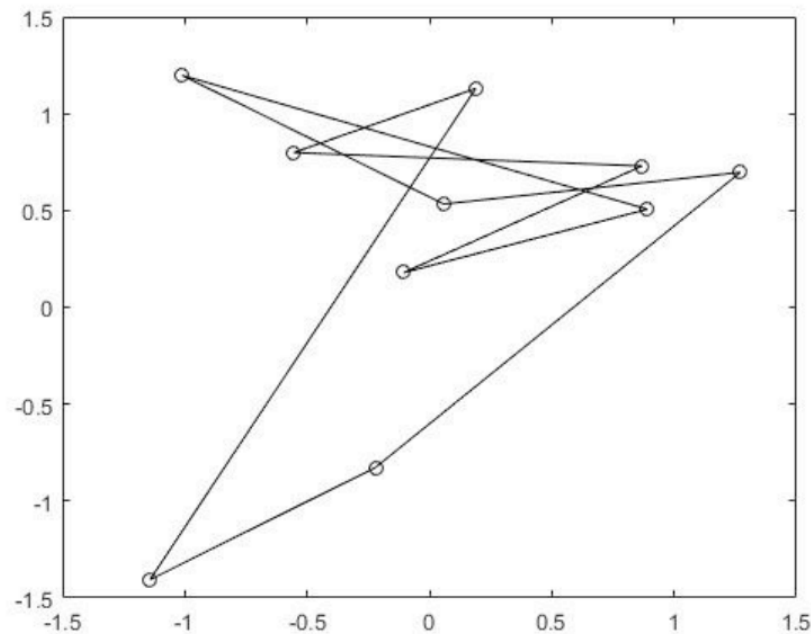

Figure-2: Sketch for question 2 for K=10

Then you looked at Cem Hoca, and realized that you still have no thunder for the lecture, and decided to improve your drawing. You marked the middle points of each edge and with the same order, you connected these points as in the first iteration. Then, continuing in this fashion, after 10 iterations, you showed your work to your friend sitting right to you. However, you could not make him interested in your work. Then, you continued further until the 100th iteration, and showed your work to your friend sitting left to you. Guess what happened? Again no interest at all ! After 900 iterations you tried the friend sitting behind you, but again did not work. As soon as you are done with the 1000th iteration, you decided to show it to the friend sitting in front of you, but you got caught to Cem Hoca! He looked at the resulting figure, and he decided to give you an assignment. He described it as:

"You are going to do this drawing in a systematic manner using MATLAB/Octave, then you will plot all the figures you showed your friends (1st, 10th, 100th, 900th, and 1000th) to different figures. However, in the last one (1000th iteration), the figure may be a little small. Therefore, centralize the resulting polygon and magnify it so that we can see the result in a clearer manner. Magnify means that you need to enlarge the final figure such that the furthest vertex (corner) from the origin is on the unit circle.

*Do not forget to plot each of **centralized version** and **magnified version** of the 1000th polygon on the same figure!"*

For an example of magnified polygon, you may refer to Figure-3. Red polygon refers to the centralized polygon whereas the blue colored one shows the magnified version.
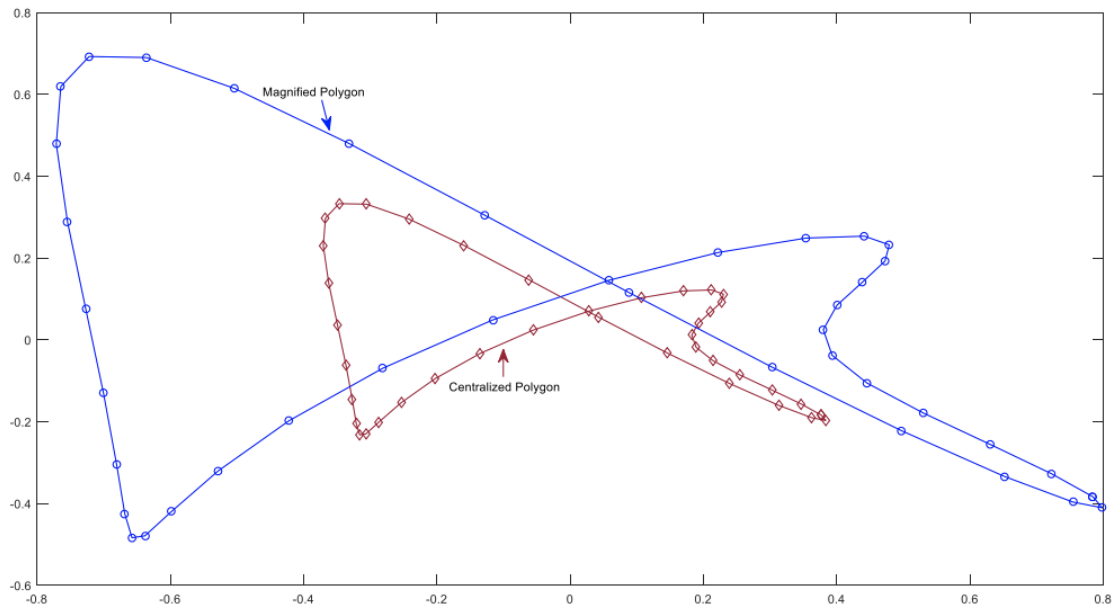

Figure-3: Sketch for the original and magnified version of a result