

CMPE 360: Numerical Methods

Homework 2 (due May 27th)

(Note: Deadline is absolute. No extensions will be given and no late submissions will be accepted)

Problem 1 (60 pts)

In this project, you will implement a natural boundary cubic spline drawing program using MATLAB. Your program should have the following features:

- The user should be able to enter a sequence of points graphically (i.e. you display a square drawing area with a grid and the user enters the coordinates graphically by clicking on the drawing area). You can use MATLAB `ginput` function to input coordinates of the clicked point.
- You should fit natural cubic splines for the parametric curves $x(t)$ and $y(t)$.
- You should solve for coefficients of the cubic splines and then draw the whole curve afterwards.

Problem 2 (40 pts)

The aim of this project is to illustrate how MATLAB can be used to quickly develop an image compression program based on singular value decomposition. Read the online tutorial on singular value decomposition (see the course web page). For the `yogi` image given in the tutorial, perform singular value decomposition using MATLAB and display the images you get for rank 10, 20, 30, 40, 100, 200 and 280 approximations of the original image. The following MATLAB functions will be useful to you:

- `svd`
- `gray`
- `image`
- `colormap`
- `reshape`