Homework #2

Due Monday, Feb 6, 2022, 11:59pm

Problem 2.1.

a) Read in the 2 column data from the file 'bfit.csv' into an np.array()

b) Print a list of the matrix, and plot the points as dots in magenta color. The x-axis is the first column, the y-axis is the second column.

c) Calculate the bounding box, and plot a red rectangle around it

d) Draw the diagonal from (xmin,ymin)-(xmax,ymax) in blue

e) Overplot the points below the diagonal in green

f) Calculate the center of mass of the points in the two halves separated by the diagonal. Plot these values shown with an asterisk on the same figure.

Problem 2.2.

a) Create a uniform array x with 101 elements between 0 and 2*pi

b) Create an array containing y = sin(3*x)

c) Create a plot y vs x

d) Create another array, z = y*y

e) Plot z vs x

f) Calculate the average of both y and z over this interval

g) How do the results of (f) change if we use 10000 points?

h) Problem 2.3.

a) Create a 21x21 grid of x and y values over a square [-1,1]x[-1,1]

b) Write a function that is a Gaussian,

$$\text{fgauss}(x, y, s) = \frac{1}{\sqrt{2\pi s^2}} \exp\left(-\frac{x^2 + y^2}{2s^2}\right)$$

c) Create a contour plot of z as a function of x,y for the values of s=1,2,3