Math-CS-143M Project-3 (30 points) **Due:** Tuesday November 9, during class **Name**: _____

x-values	y-values
-3.14159265358979	0.00000000000000
-2.81089869005402	-0.43702230525987
-2.48020472651826	-0.78170987707147
-2.14951076298249	-0.85207605602719
-1.81881679944672	-0.52335935447908
-1.48812283591095	0.22121102681686
-1.15742887237519	1.27130734031775
-0.82673490883942	2.41089249371528
-0.49604094530365	3.37539264122665
-0.16534698176788	3.92749194128624
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0.49604094530365	3.37539264122665
0.82673490883942	2.41089249371528
1.15742887237519	1.27130734031775
1.48812283591095	0.22121102681686
1.81881679944672	-0.52335935447908
2.14951076298249	-0.85207605602719
2.48020472651826	-0.78170987707147
2.81089869005402	-0.43702230525987
3.14159265358979	0.00000000000000

We want to fit two **Least Squares polynomials** to the 20-point data on the left. Notice that the interval of interest is $[-\pi,\pi]$. You will have to cut and paste the data into your computer program.

Part-I

Goal: Approximate the data by a 4th degree polynomial, $P_4(x) = a_o + a_1x + a_2x^2 + a_3x^3 + a_4x^4$ and write your coefficients in the space provided. Round your final answers to 4 decimal digits. Also plot the data points and the curve $y= P_4(x)$ together, in the spaces provided below. Do not connect the data points.

Part-II

Goal: Approximate the data by a Trig Polynomial, $S_3(x)=a_0/2+a_3Cos3x+a_1Cosx+a_2Cos2x+b_1Sinx+b_2Sin2x$ and write your coefficients in the space provided. The final answers must be rounded to 4 decimal digits. Notice that the forms of a_o and a_3 are compatible with our book but not well suited for Cooley-Tukey Fast Fourier Transform. Also plot the data points and the curve $y= S_3(x)$ together, in the spaces provided below. Do not connect the data points.

Your output/notes should be printed below:

(a) Print the Coefficients for Part-I here, rounded to 4 decimal digits:

$a_o =$	$a_1=$	$a_2=$	$a_3=$	$a_4=$

(b) Print the Coefficients for Part-II here, rounded to 4 decimal digits:

$\frac{a_0}{2} =$	$a_1=$	$a_2=$	$\frac{a_3}{2} =$	$b_1=$	$b_2=$

(c) Plot the graph for Part-I here, For full credit, your graph should be labelled properly.

(d) Plot the graph for Part-II here, For full credit, your graph should be labelled properly.

e) Your notes for Part-I must be written here. Any assumptions, equations, techniques that you used.

f) Your notes for Part-II must be typed up here. Any assumptions, equations, techniques that you used.

(g) **Do not attach your computer program.** Which computer language did you use? _____

Due Tuesday November 9 during class. Late penalty thereafter.