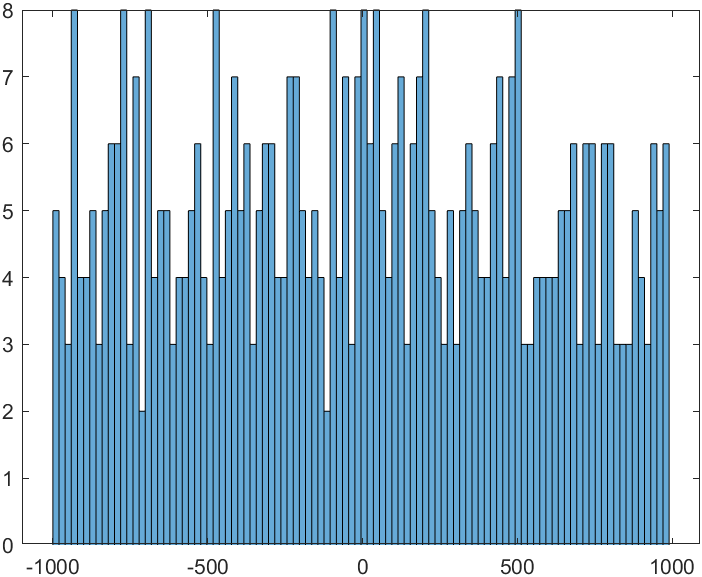
**Nilkamal Thakuria, 2018B5A70924P Assignment-I**

Q1 a) Generating random numbers (*Filename: Q1a.m*)



**Histogram**:  


Console:



Q1 b and c) (*Filename: Q1\_b\_c.m*)

Sorting algo used: Bubblesort



**Outputs of 1c)**

****

**Q2 a)** Eigen-Values (Filename: Q2\_EnergyEigenValues.m)



****

**A picture containing text, indoor, sitting, looking

Description automatically generated**

**Q2b) (Filename: Q2\_air\_resistance.m)**

Newton Raphson Method used to calculate t(time), by writing s(displacement) as a function of t, and finding its second roots, the first root being t=0.



Outputs

**Q3. File used: *Q3.m***

**Finding point of intersection of a given torus, sphere and plane using Newton Raphson Method**

  
  
OUTPUT:



Q4) **Legendre Polynomial curve fitting on an arbitrary interval [a,b]**

Files used**: *LegendrePolyCurveFitting.m****(answer to 4a)*, which contains the function, and ***Q4driverprogram.m*** is used to execute the function with the parameters(dataset, range, no of points to be generated).   


A dataset of 8 points was generated through the function f in the range [a=-5,b=5] and noise having 10% bar was added to it. All these parameters can be manipulated as per will in *Q4driverprogram.m*

f=@(x) 37\*x^5+4\*x.^4+0.5\*x.^3+7\*x;

noise=(randi(20,1,n)-10).\*f(x)/100;

y=f(x)+noise;

The plot is built into the function itself (***LegendrePolyCurveFitting.m***). Green represents Legendre Polynomial Curve Fitting.

Chart, line chart

Description automatically generated

A picture containing letter

Description automatically generated

A picture containing diagram

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Q5c) File used: *Q5c\_QuadraticSpline.m*

Outputs (Left graph represents quadratic spline, right cubic-spline. The green lines show the actual value of the function at corresponding x points)

1. f(x)=sin(x)

Chart, line chart

Description automatically generated

1. f(x)=tan(x)

Chart

Description automatically generated

1. f(x)=x^5+4\*x^4+3\*x+2;

Chart

Description automatically generated

1. f(x)=log(x)

Chart, line chart

Description automatically generated