**PROBLEM SET 2**

**Q1 (a)** Finding lambda:

**=> x\*=sqrt(2)=1.41**

**putting x =sqrt(2) and making it equal to 0**

* **Lambda = 2**

**Finding A**

**A=** = 1.36

**Q1 (b)**

**Code attached**

**Q1 (c)**

Fails= 508 times out of 10,000

**Q1 (d)**

** **

It looks evenly distributed for all p values. That means it has equal probability to give any of the p-values.

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**Q2 (a)**

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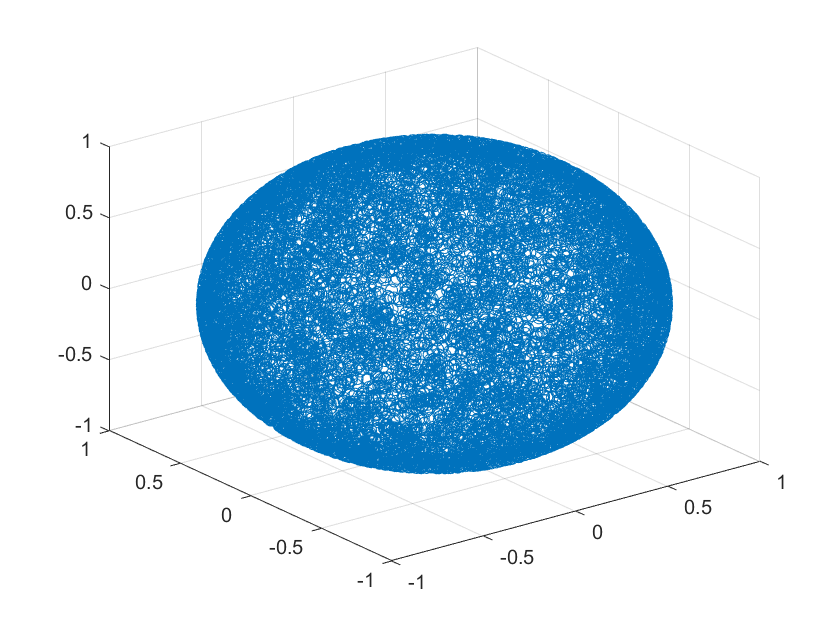
**Based on the best-fit line from the above figure, we can find the slope (m).**

**m=-0.156**

**so it decreases with N^0.156**

**Q3 (a)**

To visually show that it is not biased towards any direction, I plot a scatter plot of all the 1e4 points:



As seen above it look quite uniform.

But to statistically show, I create four quadrants of the sphere.

Q1=X Y Z, Q2=X Y-Z, Q3=X -Y Z, Q4=X -Y -Z, Q5=-X Y Z, Q6=-X Y -Z, Q7=-X -Y Z, Q8=-X -Y -Z

Below is the bar chart for the result:



It looks evenly distributed among the 8 quarters.

**Q3 (b)**

**Probability distribution:**

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**Distribution comparison with exact solution**

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**Logarithmic distribution**

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**Q3 (f)**

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**Q3 (g) Code attached**