EE 527: Machine Learning Laboratory

**Assignment 2**

Due date: 23 Jan 2023

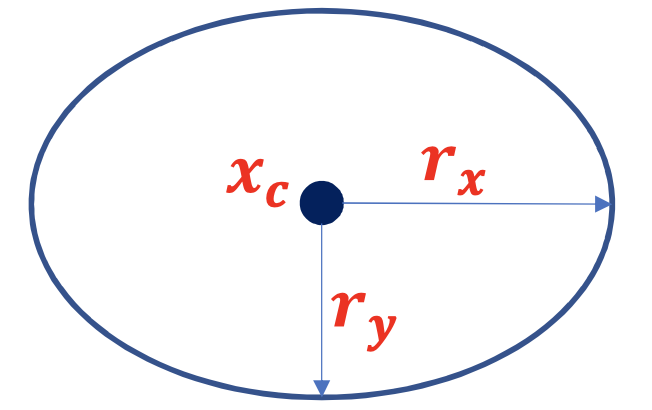
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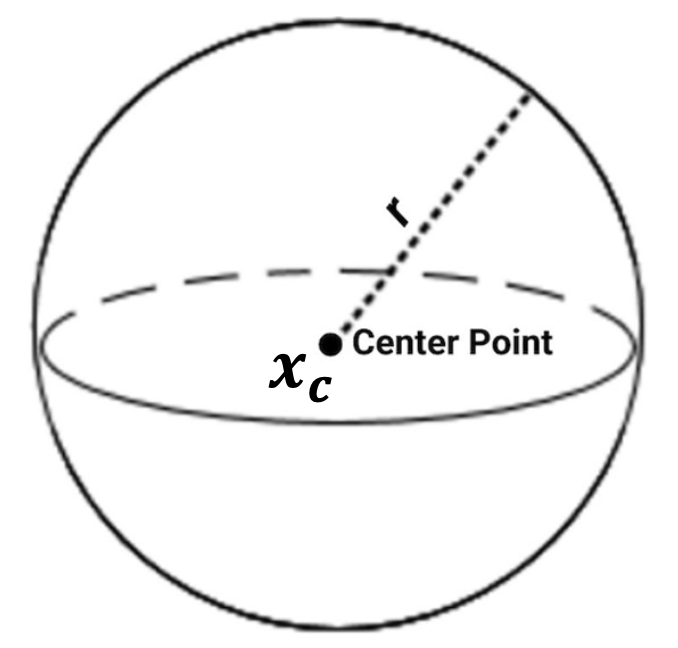
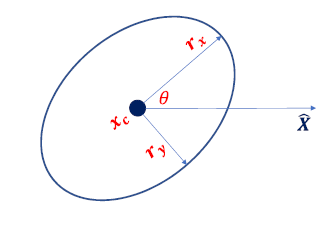
1. Generate **N** points in an interval **[a, b].** Evaluate the normalized frequency distribution of these points. Make m bins for constructing the distribution.

* Let **a** = -100 and **b** = 100.
* Experiment with **N** = 100, 1000 & 10000.
* Choose the value of m appropriately.
* Plot the normalized frequency distribution.

1. With **N** = 5000 and **m** = 400, construct a normalized frequency distribution (**Q1**). Treat this distribution as a weighted dataset , where .

Evaluate the weighted **AM**, **GM**, **HM**, **median** and **mode**.

1. Write a general code that takes any weighted dataset as input and provides the weighted AM, GM, HM, median and mode. In this particular case, and .
2. **Generation of Points**
   1. Randomly generate **n**=1000 2D points inside an a 2D ellipse of axes = 150, = 100 and centered at = (-10,20). The axes of the ellipse are aligned with the co-ordinate system axes.
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   1. Randomly generate **n**=1000 points inside a 10-Dimensional hypersphere of radius r =100, centered at xc= (-1, 2, -1, 0, 0, 0, 3, 4, 9, 0).

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  1. Randomly generate **n** = 1000 2D points inside an oriented 2D ellipse of axes , and centered at . The major axis makes an angle of with the horizontal axis .
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1. **Covariance Matrix Computation**

Compute the 2x2 Covariance Matrix **C** using the points in . Plot the Eigen Vectors of **C** and the axes of the oriented ellipse, all originating from the center . The lengths of should be respectively set to . Change the value of **n** and report observations. Try plotting with k = 3, 4, 5.

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