

**Indian Statistical Institute, Bangalore**  
**M.S. (QMS) First Year**  
**First Semester – Pattern Recognition**

Mid Term Exam      Duration: 90 minutes      Date: February 23, 2017      Max Marks: 30

**Answer all question**

1. Explain probability density function of a distribution with properties? [3]
2. Differentiate between BOX-and-WHISKER plot and Histogram plot. Which plot is more informative? [4]
3. Describe variance-covariance matrix of a data distribution? [3]
4. Define the relationship between Euclidean, normalised Euclidean and Mahalanobis distance with equations. [6]
5. If X is a data sets with 9 samples and 2 features each. Find the Euclidean and Mahalanobis distances between 2<sup>nd</sup> and 5<sup>th</sup> samples of X. Explain the reasons for the different distance values.  
$$XX = \begin{bmatrix} 4 & 5 \\ 3 & 2 \\ 3 & 2 \\ 1 & 6 \\ 0 & 2 \\ 5 & 7 \\ 7 & 9 \\ 3 & 7 \\ 2 & 1 \end{bmatrix};$$
 [8]
6. List the common properties of a distance MATRIC [3]
7. Write short notes on different learning methods [3]