CE956: Statistical Machine Learning
Department of Computer Engineering
Sharif University of Technology
Spring 2020: Sun. & Tue.: 16:30-18:00
https://vc.sharif.edu/ch/rabiee

Prerequisite Quiz – (February-16-2021) – Background Check!

Linear Algebra:

Given the linear system Ax = b:

1. What is the row space of an invertible n by n matrix A? What is the nullspace of that matrix?
2. If Ax = b has exactly one solution for every b, what can you say about A?
3. Why do the columns of every invertible matrix yield a basis?
4. What is singular value decomposition?
5. What does eigenvalue and eigenvector of a matrix A represent.
6. What is the relation between rank, pivot and rank of a square matrix A?

Stochastic Processes:

1. For a random process x(t), what is the difference between strict sense and weak sense stationarity?
2. What is an ergodic process? Are all ergodic processes stationary?
3. What is the difference between covariance and correlation for random processes?
4. What is conjugate distribution and conjugate prior in Bayesian statistics?
5. What is the input-output relation (both in time and frequency domains) of an LTI system with x(t) and y(t) as stationary stochastic input and output and h(t) as impulse response of the system?
6. Define what Markov Chain is?

Machine Learning:

1. What is the difference between transductive and inductive learning? Which one is preferred?
2. How can you avoid overfitting?
3. What is Naïve Bayes? What are the advantages of Naive Bayes?
4. What is bias-variance decomposition of classification error in ensemble methods?
5. What does deep learning means?
6. What are the pros and cons of Deep Networks?