CE956: Statistical Machine Learning
Department of Computer Engineering
Sharif University of Technology
Spring 2020: Room CE202, Sun. & Tue.: 13:30-15:00

Quiz 00 (24 Points) – (February-16-2020) – Background Check!

Linear Algebra: (8 Points)

Given the linear system Ax = b:

1. What is the column 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?

Stochastic Processes: (8 Points)

1. For a random process x(t), what weak sense stationarity means?
2. Are all strong sense stationary processes ergodic? 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?

Machine Learning: (8 points)

1. What is the difference between transductive and inductive learning? Which one is preferred?
2. How can you avoid overfitting?
3. What are the advantages of Naive Bayes?
4. What is bias-variance decomposition of classification error in ensemble method?