Stat 6894 Final Exam Questions

1. Characteristic Functions: Definition and Basic Properties
2. Characteristic Function of Normal Distribution
3. Bochner’s Theorem, Polya’s Theorem, and Characteristic Functions of Lattice Distributions
4. Inversion Formula
5. Uniqueness Theorem, Inversion Formula for Z-valued RVs, Inversion Formula for Integrable CFs
6. Finiteness of Moments of Distributions Implies Smoothness of CFs
7. Smoothness of CFs Implies Finiteness of Moments of Distributions
8. Characteristic Function of Random Vectors
9. Multivariate Normal Distribution
10. Different Types of Convergence, the Iff Condition for a.s. Convergence
11. Convergence Graph Theorem
12. Uniform Convergence to a Continuous cdf
13. Weak Convergence of Probability Measures, Quantile Function Lemma
14. Skorohod’s Theorem
15. Mapping Theorem, Uniform Integrability and Convergence in Distribution Proposition
16. Portmanteau Theorem
17. Slutsky’s Theorem
18. Helly’s selection Theorem
19. Relatively Compact Family of Probability Measures, Prokhorov’s theorem
20. Continuity Theorem
21. Weak Laws of Large Numbers, Poisson’s Theorem, Central Limit Theorem
22. Lindeberg-Feller Theorem (Statement), Lyapunov Theorem
23. Cauchy Criterion for a.s. Convergence
24. Kolmogorov’s Inequality
25. Two-Series and Three-Series Theorems
26. Toeplitz Lemma, Kronecker’s Lemma
27. Strong LLN for I.I.D. Random Variables
28. Conditional Expectation, Existence and Uniqueness of Conditional Expectation
29. Properties of Conditional Expectation: Linearity, Positivity, Monotonicity, Conditional Monotone
   Convergence Theorem, Conditional Fatou’s Lemma, and Conditional Dominated Convergence
   Theorem
30. Properties of Conditional Expectation: Conditional Jensen’s Inequality, Tower Property, Non-
   Anticipating Multiplier Property, Independence Property, and Geometrical Interpretation
31. Martingale: Definition. At least Five Examples of Martingales
32. Gambling Theorem, Stopped Martingale Theorem, and Doob’s Optional Stopping Theorem
33. Doob’s Upcrossing Lemma, Doob’s Convergence Theorem
34. $L^2$-Bounded Martingale Convergence, Doob’s Decomposition
35. UI Martingale Convergence, Levy’s Convergence Theorem
36. Doob’s Submartingale Inequality, Doob’s $L_p$ Maximal Inequality