CS 323, Spring 2017, Summary 3

1. Taylor approximation, error analysis, methods for determining n in order to achieve a specified accuracy. Pages 2-11.
2. Evaluating Taylor expansion. Page 12.
3. Bisection method and rate of convergence. Pages 14-17.
4. Newton's method. Pages 18-19.
5. Error analysis for Newton's method. Page 20.
6. Newton's method for finding minimum of convex functions. Logit Pages 12-14.
7. Logistic regression without intercept and numerical solution by Newton's method. Logit Pages 25-27, 29.
8. Linear interpolation. Pages 51-52.
9. First-order divided difference. Page 63.
10. P_1 expressed in terms of first-order divided difference. Page 67.
11. Approximation error of polynomial interpolation. Page 72. For example, what is the error when $n = 1$.
12. Natural cubic splines when $n = 3$ (data points). Pages 77-79.
13. General natural cubic splines. Page 81.
14. Given expression of a Legendre polynomial and its triple recursion relation, how to evaluate the polynomial efficiently? Page 88.
15. Chebyshev Polynomials. Derive the triple recursion relation and its efficient implementation without using recursion. Page 93.
16. Near-MiniMax Approximation for 3rd-order polynomial error analysis. Under how to use MiniMax theorem to (approximately) minimize the error and determine the allocations of data points. Pages 96-97.
17. Understand Taylor expansion for numerical integration. Page 102.
18. Derive Trapezoidal Rule. Pages 103-105.

19. Error bound Trapezoidal Rule. Understand how to use the bound to determine n. Pages 106, 109, 116-117

20. Gaussian Quadrature for $n = 1$ and $n = 2$. Pages 118-121.

21. Change of interval. Pages 126-127.

22. Linear regression. Pages 135-138.

23. Basis expansion. Pages 142-147.