Math 141B Fall 2016-Review Sheet for Final Exam

The final midterm is Wednesday 12/14/2016 in Alumni 97. It will be a cumulative exam, with extra questions on the material covered since the final midterm (Chapter 5).

This sheet only covers chapter 5, you should use the 3 previous review sheets to organize your study of the earlier material!

Definitions to know:

Riemann sum
Left and right approximations, midpoint approximation.
Upper and lower sums.
Definite integral
Integrable function
Indefinite integral

Theory to know: Below are the theorems you should know with brief summaries of them, be sure to learn the actual statement from the book.

- **Definition of definite integral:** You should be able to calculate definite integrals directly from the definition, and not from the FTOC. For example Example 2 in Section 5.2
- **Theorem 3 in 5.**2: Continuous functions or functions with only finitely many jump discontinuities are integrable.
- **Properties of definite integrals:** In 5.2 including comparison properties.
- **Fundamental Theorem of Calculus Parts I and II.**
- **Net Change Theorem:** The definite integral of a rate of change is the net change.
- **Substitution Rule**

Types of problems:

1. Approximate integrals using a finite number or rectangles and left/right/midpoint rules. For example calculus R_n or L_n for a given function on an interval.
2. Given a definite integral express it as a limit or Riemann sums.
3. Given a table of values for a function, estimate the definite integral.
4. Evaluate or estimate definite integrals by interpreting in terms of area.
5. Use the FTOC part 1 to calculate derivatives including problems needing the chain rule (5.3 #7-18)
6. Evaluate definite integrals using the FTOC part II (5.3 #19-44)
7. Calculate area beneath a curve using definite integrals.
8. Evaluate indefinite integrals appearing on the table in Section 5.3
9. Calculate net change using the net change theorem.
10. Given a particle moving, calculate displacement and distance travelled (Example 6 in 5.4)
11. Evaluate more complicated integrals using u-Substitution. Applies to definite and indefinite integrals. Be able to adjust the limits of integration as appropriate (Theorem 6 on p.416).
12. Understand how symmetry applies to definite integrals (Theorem 7 on page 417).