Math 10B First Midterm Exam Review Outline
Math 10B, Winter 2018

Midterm Exam One covers the topics discussed in lecture during Weeks 1, 2, and 3. In particular, the exam will test your mastery of the material in Sections 4.8, 5.1, 5.2, 5.3, 5.4, 5.5. Below is a summary of the topics/skills you need to master from each section; in some cases, example problems from the homework assignments are provided to illustrate what is meant by the particular skill.

- Section 4.8: Know how to find general antiderivatives (e.g. as in HW 4.8.15). Know how to find a specific antiderivative given a first or second derivative together with additional information such as input/output pair (e.g. as in HW 4.8.25). Know how to solve word problems about linear motion (i.e. dropped or tossed objects) given information about acceleration and velocity.
- Section 5.1: Given a formula for a function f or a collection of input/output pairs of f in a table or on a graph, know how to use L_n, R_n, and M_n to approximate the area under the graph of f on a given interval. Given information about velocity, know how to use L_n, R_n, and M_n to approximate distance travelled (e.g. as in HW 5.1.12).
- Section 5.2: Know how to use L_n, R_n, and M_n to approximate definite integrals. Know that a definite integral is signed area and be able to use this together with the area formulas for circles, triangles, and rectangles to evaluate definite integrals (e.g. as in HW 5.2.31, 5.2.34, etc.). Know how to evaluate definite integrals using the properties:
  (1) If $b < a$, then $\displaystyle\int_a^b f(x)\,dx = -\int_b^a f(x)\,dx$ (e.g. as in HW 5.2.40).
  (2) If $a < b < c$, then $\displaystyle\int_a^c f(x)\,dx = \int_a^b f(x)\,dx + \int_b^c f(x)\,dx$ (e.g. as in HW 5.2.48).
- Section 5.3: Know how to evaluate definite integrals using basic antiderivative formulas together with the FTC (e.g. as in HW 5.3.18). Know how to evaluate indefinite integrals using basic antiderivative formulas (e.g. as in HW 5.3.43). Know how to integrate the absolute value of a given function. Know how to calculate displacement and distance travelled.
- Section 5.4: Know how to use the FTC to take the derivative of a function which is defined as an integral (e.g. as in HW 5.4.14). Given a graph of a function f, be able to understand the meaning of a function of the form $F(x) = \displaystyle\int_a^x f(t)\,dt$ in terms of signed areas, and be able to answer questions about the local extrema of F and identify the intervals on which F is increasing, decreasing, concave up, and concave down (e.g. as in HW 5.4.19).
- Section 5.5: Know how to evaluate indefinite integrals using u-substitution. Know how to evaluate definite integrals using u-substitution.

In addition to the calculus topics, make sure to review your pre-calculus skills:

- Know how to evaluate trig functions at standard angles, e.g. $\sin(\pi/3)$, $\cos(\pi)$, etc.
- Know the definitions of $\sec(\theta)$, $\csc(\theta)$, $\arcsin(t)$, $\arctan(t)$
- Know how to graph basic functions:
  (1) $y = mx + b$, e.g. $y = 3x - 2$, $y = 6$, etc.
  (2) $y = ax^2 + bx + c$, e.g. $y = 12x^2 - 17x + 6$, etc.
  (3) $y = x^3$
  (4) $y = \sin x$
  (5) $y = \cos x$
  (6) $y = e^x$
  (7) $y = \ln x$