A Short Review for Exam 1
Updated 9/13/20, SH

Exam 1 will mainly include problems similar to those on HW1 and HW2. It may go a little further, up to Ch. 6.3, to check you are keeping up with the lectures. Chs. 6.2 and 6.3 may appear again on Exam 2, probably in more depth. There may also be 1-2 conceptual questions, such as TF or proofs, mentioned below. There are several good ways to prepare, but mainly work exercises and learn the main theorems.

I am writing some of this with Exam I from Fall 2016 in mind, which you can find on my exam web page. If you study from that, know that some examples and topics, such as $\ln(x)$, had been covered in more depth then. So you might have trouble with 1b, 2a and 7.

Exercises: Check that you can still do 90% of the assigned homework (in HW1 and HW2), alone with closed book. In 6.2 and 6.3 (in HW3) aim for less, maybe 60%. The exam may have some longer problems than the quizzes did, such as 5.2.43 (See Fall 2016, #8). So, you may want to practice more with those. Correct any mistakes on Quiz 0 and Quiz 1, including memory gaps.

You can also practice by working out the textbook Examples by yourself, the solved ones. Try them first with closed book, and peek if you get stuck. If you have the MLP software you can practice with that, but don't let it become a crutch. When ready, you might try my old exams, but that is not an ideal way to learn.

Memorize as needed:

* The 4 summation formulas. See 2016 #1. And most textbook theorems.

* The derivative formulas from MAC 2311, including inverse trig (and know the antiderivative versions). See #2c and maybe #7.

* Practice the new form of the substitution method.

* Review trig values and identities, including at a minimum, the steps to solve $\int \sin^2 x \, dx$ or $\int_0^\pi \cos^2 x \, dx$. See #2e (and #4, though evaluation was not required in 2016.)

* Riemann sum notation (but I use x_k^* instead of the textbook's c_k). See #5, #6 and #8.

Conceptual questions: I may ask you to choose a proof from a short list on your exam. Probably 1-2 would come from the list below (see 2016 #10, but those proofs came from a different prep list). Prepare for at least two out three of these:

* The M.V.Theorem (Thm 3, page 330). I went over this briefly in class, but suggest you learn the more careful textbook version.

* The F.T.C Part I (see page 332, but the proof is on page 333). You can learn the abbreviated lecture version [I expect to do this on 9/15/20] or the textbook version, which uses the M.V.Thm to explain one step more clearly.

* Explain the definition of volume on page 369, $V = \int_a^b A(x)\,dx$. Learn approx 30% of page 369, the part just above the definition, and be able to explain the notation used. We did this in class, and you can use your lecture notes if you prefer. I might vary this question by asking you to explain the Disk, Washer, or Shell Method instead. Your revised answer would be very similar, but would include, for example, a picture of a disk with remarks on its area or volume.

Your proofs should normally include plenty of words, maybe not exactly the same as the textbook, but approx as many words, enough to guide the reader clearly. Prepare also to state the theorems, including the hypotheses. Other possible conceptual questions are definitions (of the definite integral, etc, see 2016 #6 for example), or a True-False section. You can practice sample True-False questions from many sources, such as my old exams, or perhaps online. Many are based directly on the main theorems and definitions, and key examples, so study those too.

Be prepared for all the topics we have covered in class such as average value, distance traveled, partitions, the definition of the integral and "integrable", the main summation formulas, the 3 main theorems in 5.4 [the MVT, the FTC#1 the FTC#2], initial-value problems, substitution (both 5.5 and 5.6), area between curves, the volume methods in 6.1-6.2 and arc length in 6.3. I probably won't ask about the hardest examples from 6.2 or 6.3 on this exam.