A quick review for Exam 2, SH

Exam 2 will mainly include problems similar to those on HW3 and HW4 [Chs. 6.2 thru 8.4]. This overlaps Exam I slightly [Chs.6.2, 6.3]. It may include lecture topics up to 10/8/20 [Chs. 8.5, 8.6] but with only fairly simple questions on those. No 8.7 or 8.8 on this exam. There are several good ways to prepare, but mainly work exercises and learn the main theorems.

Exercises: Check that you can still do 90% of the assigned homework, alone, with a closed book and no software. You may want to practice more with the longer homework exercises. The chapter review problems may provide even better practice because you have fewer clues about which technique to use.

If you still have problems, resolve them asap by studying more (reading the textbook or the lecture notes, etc) or by getting help. Melissa will have a review session on Monday. You can also practice by working out the textbook Examples by yourself, the solved ones. Try them first with closed book, and only peek when you are stuck. If you have the MLP software you can practice with that, but don't let it become a crutch.

Most of the integrals in Ch. 8.2 thru 8.5 fit into certain standard types which you can recognize quickly, after enough practice. You will probably need to memorize the main patterns. Also remember that many integrals require some trial and error. For those, you may need some practice at changing a problem into an easy problem, or at least some other problem. Memorize the main trig identities for that, for $\int \sin^2 x \; dx$, for $\int \sin 2x \cos 3x \; dx$, etc. Memorize the partial fraction rules. Know most of Table 8.1. Don't memorize the reduction formulas, but as a relatively hard problem I may ask you to derive one of them (this usually involves IBP twice followed by "the trick" done in class).

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. Some of the old exams on the Exam Page include remarks on good proof-writing style and common mistakes in proofs. Prepare for most of these:

* Prove (or explain in detail) the main formulas in Ch. 6 which reduce some general problem about volume / length / area / etc to an integral. I

am referring to the formulas for the Disk Method, Washer Method, Shell Method, Arc Length and Surface Area. In each case, explain how the problem can be chopped into simpler parts (with pictures and approximate formulas), then write out the Riemann sum and the integral. You can study from the textbook or lecture notes.

* Proofs based on the definition of $\ln x$. The hardest would probably be the formula for $\ln(ab)$. The easiest might be $\ln 1 = 0$.

* Prove a reduction formula. These are a little harder and perhaps less important than the proofs above, so these are less likely. On the positive side, they require very little verbal explanation.

True-False is possible. Practice with TF helps build logical skills and attention to the main ideas, mostly contained in definitions and theorems. Some standard examples in the text and lectures are also given to convey such ideas. You can find many TF for practice on the Exam Page.