

## Exam 2 Information Math 122 Fall 2017

The exam will be held on Friday, October 6, at the regularly scheduled class time in Taylor Center Auditorium (room 0080). I will provide you with a green book to write your answers in. Do not use either the book or your notes or any calculator or other electronic device during the exam. All you need to bring with you is a pencil, an eraser, and your understanding of the material.

There will be four topics: volume of revolution by washers, volume of revolution by cylindrical shells, surface area of revolution, and applications to physics and engineering. There will be one problem per topic, possibly divided into smaller parts. Below I summarize the techniques you should be familiar with and the way you should prepare yourself for the exam.

**Volume of revolution by washers:** Given bounding curves and the axis of revolution, be able to draw the two-dimensional region, draw the three-dimensional volume of revolution, calculate the volume of the typical washer, set up the integral for volume correctly, and evaluate the integral correctly.

**Volume of revolution by cylindrical shells:** Given bounding curves and the axis of revolution, be able to draw the two-dimensional region, draw the three-dimensional volume of revolution, calculate the volume of the typical cylindrical shell, set up the integral for volume correctly, and evaluate the integral correctly.

**Surface area of revolution:** Given bounding curves, be able to set up the integral correctly, simplify the integral as we did in class, and evaluate the integral correctly.

**Applications to physics and engineering:** Be able to compute the work involved in lifting a chain, possibly with a leaky bucket attached, or compute the work involved in pumping water out of a volume of revolution, or compute the total hydrostatic force on a region submerged in water. You should be able to set up the appropriate riemann sum that approximates the answer, set up the definite integral representing the exact answer, and calculate the exact answer by integration correctly.

**Miscellaneous skills:** You will need to use integration techniques you have learned so far in the course: integration by parts, trigonometric substitution, and/or partial fraction decomposition. Know how to use the  $I_n$  and  $J_n$  formulas for trigonometric integrals to express an answer in terms of these

symbols. Know how to make a substitution into the limits of a definite integral.

**How to study for the exam:** The single most important thing you can do is to do the homework carefully, completely, and correctly. The lectures provide you with an overview, and the tutors can help you with some computations, but when you are in the exam room you are on your own and need to have complete mastery of the techniques.