MATH 1952 Concept List for final exam

Here is a rough list of concepts which we've covered in class, and which could appear on the final exam. I do not promise that this list is absolutely exhaustive; there may be subconcepts which I am not specifically listing. But this contains all of the important topics, and should be useful as a study aid.

- Know what an antiderivative/indefinite integral is and know the antiderivatives of all basic functions covered in class (like $\sin x$, e^x, x^n, $\frac{1}{x}$, etc.)

- Know how definite integrals can be represented as signed area (positive or negative according to whether the area is above or below the x-axis)

- Know the Fundamental Theorem of Calculus and how to use it to compute definite integrals.

- Know how to use the u-substitution technique to find integrals.

- Know how to use definite integrals to find the area between two curves.

- Know how to find volumes of solids of revolution by using either the disc/washer method (if the axis you're rotating around matches the variable) or the cylindrical shells method (if the axis you're rotating around matches the function).

- Know how to set up and solve simple work problems by using integrals.

- Know how to find the average value of a function between two x-values by using integrals.

- Know how to use the integration by parts method to find integrals of products.

- Know how to use trigonometric substitutions to find integrals of functions containing expressions like $\sqrt{1-x^2}$, $\sqrt{4+x^2}$, or $\sqrt{x^2-9}$.

- Know how to find integrals of functions of the form $\sin^m x \cos^n x$ or $\sec^m x \tan^n x$ by using trigonometric identities and/or u-substitutions.

- Know how to use polynomial long division and the method of partial fractions to find integrals of rational functions.

- Know how to use the integration by parts method to find integrals.

- Know how to use Riemann sums with left/right endpoints or midpoints, trapezoidal approximations, or Simpson's rule to approximate definite integrals. This includes deciding how large your n needs to be to be sure that your error is

smaller than some predetermined value like .01.

• Know how to use the integration by parts method to find integrals.

• Know how to find the length of a curve by using definite integrals.

• Know how to find the surface area of a solid of revolution by using definite integrals.