Midterm 1 Conceptual Review

MATH 146, Fall 2019

- Midterm 1 is on **Tuesday, October 1** from **5:50–7:50 pm** in our classroom.
- The exam will cover the material from class related to the following sections of the text:

$$5.3,\ 5.7,\ 6.1-6.5,\ 7.1-7.3,\ 7.5,\ 11.1.$$

- The best preparation is to **practice, practice, practice** working and re-working problems. This includes **book problems** and **quiz problems**.
- Check out the **Daily Update** to check whether you are familiar with all the topics.
- Check out **extended office hours** that will be posted on the course website.

Finding antiderivatives $(5.3,\ 5.7,\ 7.1-7.3,\ 7.5)$

- **Concepts**: Antiderivative of a function, antiderivatives of basic functions, substitution method (including for definite integrals), integration by parts (including for definite integrals), trigonometric integrals, trigonometric substitution, partial fractions decomposition
- **Goals**: Find the general antiderivative of a given function using a variety (and sometimes a combination) of methods; compute definite integrals using the Fundamental Theorem of Calculus, Part II; identify the domain of an integrand, and the domain of the antiderivative
- **Homework problems/additional practice problems**:
  - **5.3**: 9, 25, 33 / 40, 41, 63
  - **5.7**: 21, 34, 46, 55, 77, 78, 96, 99, 101-104 / 80, 110, 111
  - **7.1**: 9, 15, 20, 29, 35, 36, 38, 46, 50, 56 / 49, 76, 77
  - **7.2**: 6, 10, 31, 34, 36, 48, 51, 53, 74 / 22, 54, 75
  - **7.3**: 4, 6, 13, 14, 17, 25, 27, 34, 44, 47 / 12, 30, 43
  - **7.5**: 1, 2, 5, 7, 11–13, 15, 19, 21, 31, 41, 43 / 51, 55, 59

Areas and volumes via integration $(6.1-6.4)$

- **Concepts**: Area between curves, area bounded between a curve and x- or y-axis; volume of 3-dimensional solid; solid of revolution; average value of a function on a closed interval; disk method; washer method; method of cylindrical shells
- **Goals**: Calculate the area of a given region of a graph, possibly bounded between curves or axes; calculate the volume of a solid body, including that of a solid of revolution; find the average value of a function on an interval; compute the volume of a solid using integration
- **Homework problems/additional practice problems**:
  - **6.1**: 12, 18, 19, 21, 50, 55 / 28, 52, 65
  - **6.2**: 3 - 6, 11, 16, 19, 55, 58 / 15, 46, 59
  - **6.3**: 13, 18, 25, 26, 53, 56, 58, 59 / 14, 22, 62

- **6.4**: 6, 12, 19, 27, 28, 31, 32, 47, 48 / 24, 34, 61

Applications of integration to physics (6.5)

- **Concepts**: Work, energy, force due to gravity, Hooke's law
- **Goals**: Compute total work required in a variety of setups; for instance: to move an object along the x-axis by applying a given force, to stretch or compress a spring, to build a structure, to pump liquid from a tank
- **Homework problems/additional practice problems**:
  - **6.5**: 6, 10, 14, 15, 20, 21, 22, 27 / 11, 30, 35

Parametric equations (11.1)

- **Concepts**: Parametic equations, parametric curve
- **Goals**: Sketch a graph of a parametric curve, eliminate the parameter in a parametric curve (if possible), find the slope of the tangent line to a parametric curve at a given point, find the area under a parametric curve
- **Homework problems/additional practice problems**:
  - **11.1**: 11, 21, 24, 61 - 64, 91 / 55, 58, 80