

Assignment 6: The Fundamental Theorem of Calculus Weeks 9 and 10

In class on Friday, [Day 22]:

The Area Function: An exploration of ideas underlying the Fundamental Theorem of Calculus

The *Fundamental Theorem of Calculus* has two parts:

Part 1: If f is a continuous function from a to b , then f is the derivative of the function F defined by $F(x) = \int_a^x f(x) dx$. In other words, definite integrals can be used to find antiderivatives.

Part 2: If F is any function whose derivative throughout the closed interval $[a, b]$ is f , then

$$\int_a^b f(t) dt = F(b) - F(a).$$

In other words, one way to find the value of the definite integral $\int_a^b f(t) dt$ is to find any antiderivative $F(t)$ of $f(t)$, and then calculate $F(b) - F(a)$.

- In class on Friday, we will work in groups on a worksheet which will help us to understand the ideas behind Part 1 of the Fundamental Theorem. This handout will be available when you turn in your work on Test 2.
- Homework:
 - Complete the problems on the handout, The Area Function
 - Project 1 will be available on Friday; read this before coming to class on Monday.
 - Continue to work on Web Work problem sets Chap8, A – F, DUE on March 26.

In class on Monday, [Week 9, Day 23]:

- We will take some time in class to get started on Project 3.
- Then I will introduce the major ideas of Chapter 9 in a lecture.
- I will return the tests to you at the end of class on Monday.
- Homework: Work on the Project, which is due on March 22.

In class on Wednesday, [Day 24]:

- Section 9.1: *Reliability Theory: How Long Do things Last?*
We will work through the Examples, Activities, and Checkpoints together and in your small groups.
- Homework:
 - Continue to work on the project.
 - Study Section 9.1, and complete the Examples, Activities and Checkpoints if you do not finish them in class.

In class on Friday, [Day 25]:

- Questions about the Project?
- Continue discussion of Section 9.1: *Reliability Theory: How Long Do things Last?*
Work through Examples, Activities, and Checkpoints together and in small groups.

In class on Monday, [Week 10, Day 26]:

- Project 3 is due.
- Section 9.2: *Improper Integrals*
The problems in Section 9.1 motivate the need for discussion of ideas about infinity, improper integrals, and limits. We will work through the Examples, Activities and Checkpoints together.

Test 3 is scheduled for Friday, [Day 28]. It will cover the following topics:

- Fundamental Theorem of Calculus – Concepts covered in the handout: The Area Function
- Calculation of derivatives, antiderivatives, and definite integrals
- Concepts covered in Project 3
- Sections 9.1, 9.2, and ideas about limits and improper integrals
- There will be no Benchmark questions on this test.