Section 2

TA: Dante Buhl

UCSC Math-19B

January 26, 2024

Plan for Today

Topics to Cover

- Review Activity
- Substitution Method

Section Activity 2

- 3 questions

Assignments

- Homework 2 (Due Fri, Jan. 26^{th})

Learning Outcomes

- Using FTC P.1 and P.2 to compute integrals.
- Develop strategies for finding anti-derivatives.
- Understand how to use and apply u-substitution for integrals/anti-derivatives.

Review Activity

U-Substitution

U-Substitution is an extremely useful method for integration. It relies on using a change of variables (substitution) in order to integrate a simpler function. It is essentially the chain rule for derivatives in reverse.

The Chain Rule.

$$\frac{d}{dx} f(g(x)) = f'(g(x)) \cdot g'(x)$$

U-Substitution

$$\int f'(g(x))g'(x)dx$$

$$u = g(x) \rightarrow \frac{du}{dx} = g'(x)$$

$$du = g'(x)dx$$

$$\int f'(g(x))g'(x)dx = \int f'(u)du$$

Example:

$$\int 2x \cos x^2 dx$$

$$u = x^2, \rightarrow du = 2xdx$$

$$\int 2x \cos x^2 dx = \int \cos u du = \sin u + c = \sin x^2 + c$$

Section Activity 2 (Access Code: 118f2)