MATH 152

Today

1. Questions/WeBWorK
2. 5.4 The Fundamental Theorem of Calculus

Goals:

1. 5.4 The Fundamental Theorem of Calculus (Understand both parts of the FTC and how to apply them)

Where is today's material used?

1. Physics: distance traveled by a particle (among many others)
2. Chemistry: fraction of gas molecules that can participate in a reaction (among many others)
3. Economics: finding total cost given marginal cost (among many others)
4. Any discipline that includes a notion of accumulated change.

5.4: The Fundamental Theorem of Calculus

1. **Theorem (Mean Value Theorem for Integrals):** If f is continuous on $[a, b]$, then there is some $x_0 \in [a, b]$ such that $f(x_0) = \frac{1}{b-a}\int_a^b f(x)dx$.
2. **Theorem (Second FTC):** If f is continuous on an open interval I containing a, then for all $x \in I$, $\frac{d}{dx}\left(\int_a^x f(t)dt\right) = f(x)$.
3. The **indefinite integral** of f with respect to x is the family of all antiderivatives of f, denoted $\int f(x)dx$.
4. Examples: 5.4, p. 298: 14, 25, 26, 22

Next Time

1. 5.5 u-Substitution
2. Turn in WeBWorK 5.4, Set06-FTC: 2, 11