To the FTC:

Part 2 is also called the Net Change Theorem:

if \( f(x) \) is a continuous function and \( F(x) \) is its antiderivative, then the net change of \( F(x) \) from \( x=a \) to \( x=b \) is

\[
F(b) - F(a) = \int_a^b f(t) \, dt.
\]
Last time, we stopped at the substitution rule for the indefinite integrals:

Substitution rule

For any differentiable function $u(x)$:

$$\int f(u(x))u'(x) \, dx = \int f(u) \, du \bigg|_{u=u(x)}$$

By the end of this lecture, you will be able to do:

- compute indefinite and definite integrals using the substitution rule
- recognize when a substitution may be used to
- construct an integral or a sum of integrals that can be used to find the area of the region bounded by two or more curves by considering approximating rectangles that could be vertical (of widths $\Delta x$) or horizontal (of widths $\Delta y$)
- use the interpretation of the definite integrals as the area under the curve to determine the region whose area is $\int_a^b |f(x) - g(x)| \, dx$. 