Chapter 13 Formula Overview

- $\int f(x)\,dx = $ indefinite integral $=$ general antiderivative of $f(x)$ (will include a $+C$)

- $\int_a^b f(x)\,dx = $ definite integral $=$ signed area between $f(x)$ and x axis from $x = a$ to $x = b$ (this will be a number).

- $\int_a^b f(x)\,dx = F(b) - F(a)$, where $F(x)$ is any antiderivative of $f(x)$ (that means $F'(x) = f(x)$). This is the fundamental theorem of calculus.

  Notable business uses of the fundamental theorem:

  - $TR(x) = \int_0^x MR(q)\,dq$

  - $VC(x) = \int_0^x MC(q)\,dq$

  - $TC(x) - TC(0) = \int_0^x MC(q)\,dq$, so $TC(x) = \int_0^x MC(q)\,dq + FC$

  - $P(x) = \int_0^x MR(x)\,dx - \int_0^x MC(x)\,dx - FC = \int_0^x MR(x) - MC(x)\,dx - FC$

- If $f(x)$ is above $g(x)$ from $x = a$ to $x = b$, then the area between $f(x)$ and $g(x)$ from $x = a$ to $x = b$ is given by

  Area between $= \int_a^b f(x) - g(x)\,dx.$