September 26

SWBAT:

Evaluate definite integrals using the Fundamental Theorem of Calculus

$$\int_{-a}^{1} x^2+x\,dx = \int_{-a}^{1} x^2\,dx + \int_{-a}^{1} x\,dx$$

$$\int_{-a}^{0} x^2\,dx + \int_{0}^{1} x\,dx + \int_{-a}^{0} x\,dx + \int_{0}^{1} x\,dx$$

$$-\int_{0}^{-a} x^2\,dx + \int_{0}^{1} x^2\,dx - \int_{0}^{-a} x\,dx + \int_{0}^{1} x\,dx$$

$$-\left(\frac{-a^3}{3}\right) + \frac{1^3}{3} - \left(\frac{-a^2}{2}\right) + \frac{1^2}{2}$$

$$\frac{a^3}{3} + \frac{1}{3} - \frac{a^2}{2} + \frac{1}{2}$$

$$\int_0^5 f(x)\,dx = 5 \qquad \int_0^5 g(x)\,dx = 12$$

$$\int_0^5 \big(f(x)+g(x)\big)\,dx = \int_0^5 f(x)\,dx + \int_0^5 g(x)\,dx$$

$$5 + 12 = 17$$

2. Without changing the value of *a*, how could you use the values of the accumulation function in question 1 to find $\int_0^3 f(t)\,dt$? Explain your thinking.

$$\int_0^3 f(t)\,dt = \int_{-3}^3 f(t)\,dt - \int_{-3}^0 f(t)\,dt = -.6 - .6 = -1.2$$

$$A(x) = \int_{-3}^{x} f(x)\,dx$$

3. Without changing the value of *a*, use the accumulation function and your thinking from question 2 to find the following. For each, be sure to explain your thinking.

   a. $\int_1^4 f(t)dt = \int_{-3}^4 f(t)\,dt - \int_{-3}^1 f(t)\,dt = A(4) - A(1)$

   b. $\int_{-2}^2 f(t)dt = \int_{-3}^2 f(t)\,dt - \int_{-3}^{-2} f(t)\,dt = A(2) - A(-2)$

   c. $\int_0^{-1} f(t)dt = \int_{-3}^{-1} f(t)\,dt - \int_{-3}^{0} f(t)\,dt = A(-1) - A(0)$

   $-\left(\int_{-3}^{0} f(t)\,dt - \int_{-3}^{-1} f(t)\,dt\right)$

5. The top graph on page 1.4 is the graph of the accumulation function, $y = A(x)$, for the function f from the previous pages, and the bottom graph shows the graph of its derivative, $y = A'(x)$.

   a. Choose several values of x and find the corresponding values of $A'(x)$. For each of these, how do they compare to the value of $f(x)$ for that x? What do you observe? Does this make sense? Explain.

   b. Given your response to a, complete the following:

      $f(x)$ is ______________________ of $A(x)$.

      $A(x)$ is ______________________ of $f(x)$.

use "derivative" and "anti-derivative"