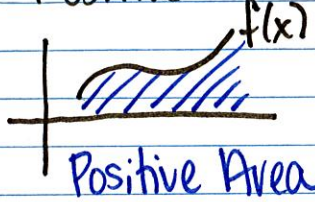
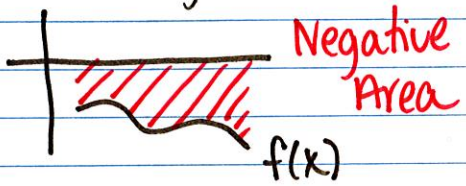
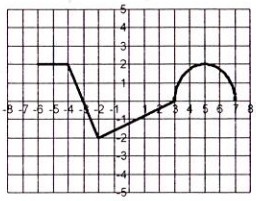
What are you doing when you Integrate a function?

You are finding the area between a function and the x-axis.

Some Area is Positive & Some Area Is Negative







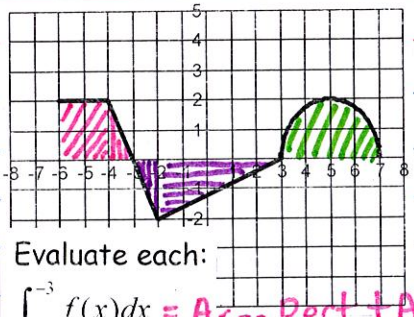
Evaluate each:

$\int_{-6}^{-3} f(x)dx$

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

$\int_{3}^{7} f(x)dx$

$\int_{-6}^{7} f(x)dx$



Evaluate each:

Areas:

rectangle = $l \cdot w$

triangle = $\frac{1}{2} b \cdot h$

circle = πr^2

trapezoid = $\frac{h}{2}(b_1 + b_2)$

$\int_{-6}^{-3} f(x)dx$ = Area Rect + Area Δ = $2 \cdot 2 + \frac{1}{2}(1)(2) = 4 + 1 = 5$

$\int_{-3}^{3} f(x)dx$ = $-[A_\Delta + A_\Delta] = -\left[\frac{1}{2}(1)(2) + \frac{1}{2}(5)(2)\right] = -[1+5] = -6$

$\int_{3}^{7} f(x)dx$ = Area $\odot = \frac{1}{2}\pi(2)^2 = \frac{1}{2} \cdot 4\pi = 2\pi$

$\int_{-6}^{7} f(x)dx = 5 - 6 + 2\pi = 2\pi - 1$

How can you rewrite the following integral?

$-\int_a^b f(x)\,dx =$

$$-\int_a^b f(x)\,dx = \int_b^a f(x)\,dx$$

Evaluate the following integral.

$\int_a^a f(x)\,dx =$

$\int_a^a f(x)\,dx = 0$

- Remember if you integrate from $[a, a]$ then your width $= 0$