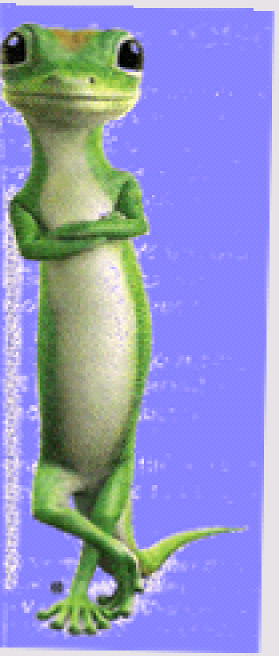
4.3--The Definite Integral as Area

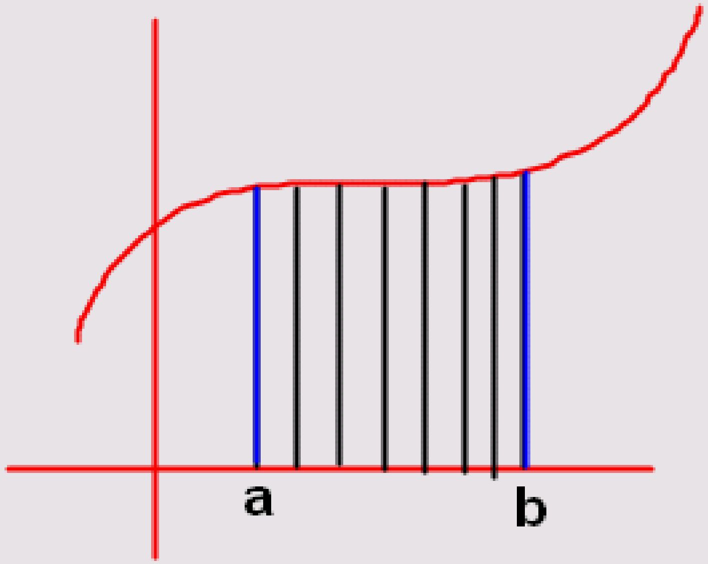


$$A = \Delta x[f(x_0) + f(x_1) + ... + f(x_n)]$$

What we've been doing!

If you keep drawing more and more rectangles, then Δx gets smaller and smaller...

$$\text{Area} = \lim_{\Delta x \to 0} \sum_{i=0}^{n} f(x_i)\cdot\Delta x = \int_a^b f(x)dx$$



(see pg 267) Definition of Definite Integral

Area can be defined as such as long as f is continuous & nonegative (above x-axis)

see bottom of p. 268

IF the curve dips below the x-axis it's a WHOLE NEW ballgame!

(Later!)

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

This is called the "definite integral of f(x) from a to b." These #s at top and bottom are call the upper and lower limits of integration. They are what make the integral "definite"

NOW, the value of a definite integral IS NOT ALWAYS AREA! Only if f(x) is positive!

So, if I say just evaluate the integral, we are not talking about the area...just the value of the integral (more on area later, tho!)

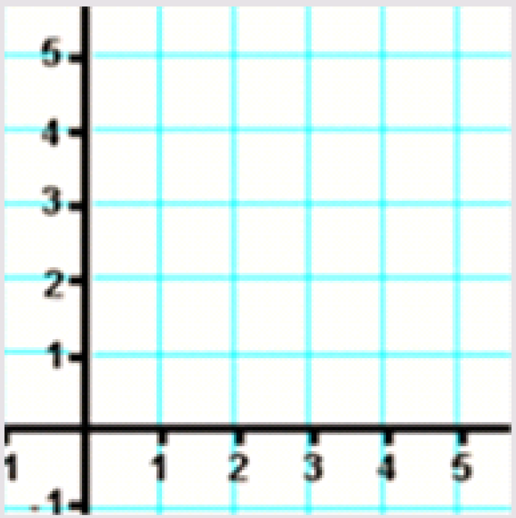
Let's see how we can relate integrals to area...

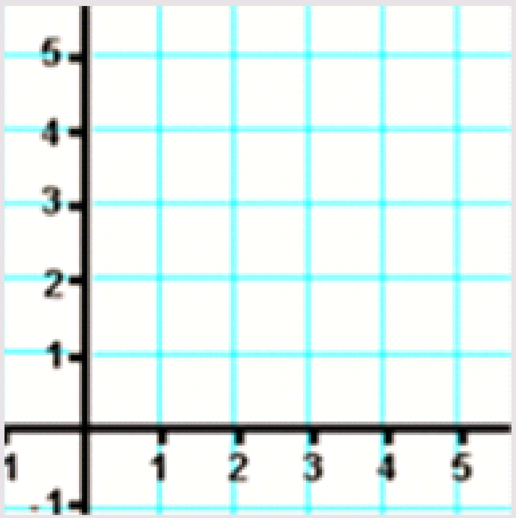
ex 3 Sketch the region corresponding to each definite integral. Then evaluate each integral using a geometric formula.

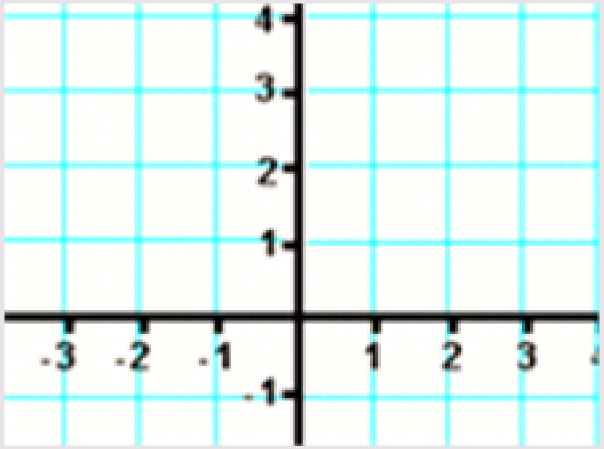
(a) $\int_{1}^{3} 4dx$

(b) $\int_{0}^{3} (x + 2)dx$

(c) $\int_{-2}^{2} \sqrt{4 - x^2}\, dx$







How to evaluate a definite integral....FTC....lesson4.4

Properties of Definite Integrals: (pg 270)

edit...put props here...then work even #s as examples...34,36,38

[redacted]