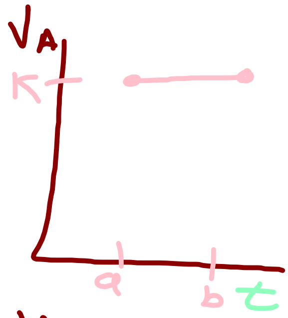
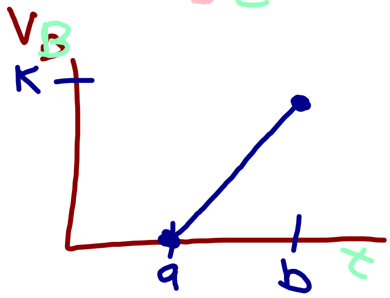
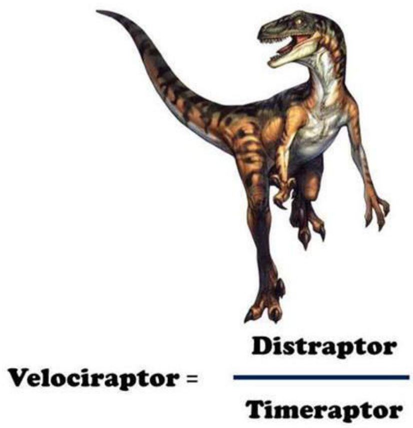
Vehicle A travels at a constant rate of k mph on the time interval [a, b]. Vehicle B has a speed of 0 mph at time t = a and steadily increases up to a speed of k mph at time t = b. Represent this situation graphically. Plot mph versus time.







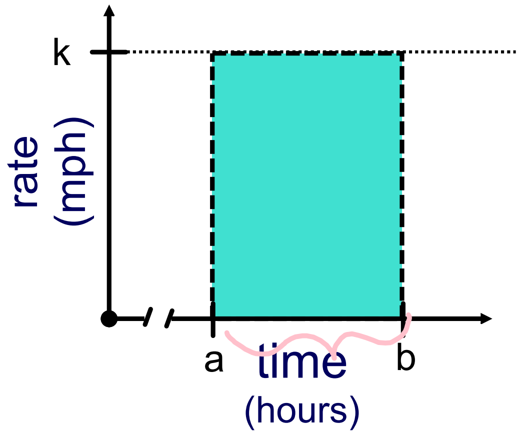
Feb 2-8:57 PM

Calculus for Life Sciences

Section 7.3

May 13-10:02 PM

A vehicle travels at a constant rate of k mph on the time interval $a \le t \le b$. What does the area of the box represent?



$(b-a)\cdot k$

time · rate = dist

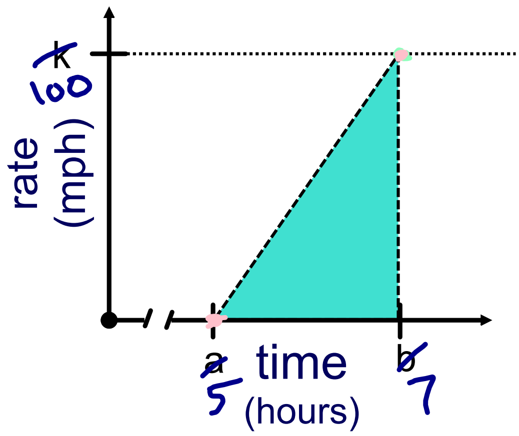
$\cancel{\text{hours}} \cdot \frac{\text{miles}}{\cancel{\text{hour}}} = \text{miles}$

Feb 2-8:57 PM

A vehicle has a speed of 0 mph at time t = *a* and steadily increases up to a speed of *k* mph at time t = *b*. How far does the vehicle travel in terms of a, b, and k?

$\downarrow$

area



$\frac{1}{2}(b-a)(k)$

hrs   m/hr   = miles

$\frac{1}{2}(2)\cdot 100 = 100$ miles

Feb 2-8:57 PM

Indefinite vs Definite Integral:

If F'(x) = f(x), *then:*

$$\int f(x)\,dx = F(x) + C$$

where C is some constant value.

The area between the curve f(x) *and the x-axis on the interval* [a,b] *is given by:*

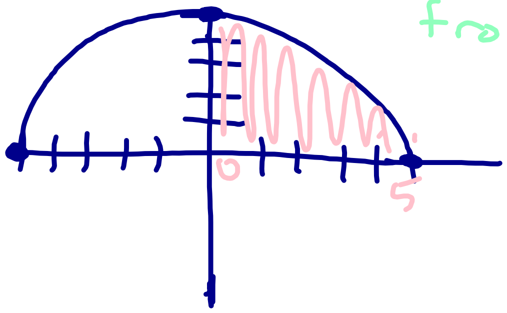
$$\int_a^b f(x)\,dx \leftarrow \text{in terms of } x$$

Nov 17-9:13 PM

Evaluate the following integral:

$$\int_0^5 \sqrt{25 - x^2}\,dx = \frac{1}{4}\pi(5)^2 = \frac{25}{4}\pi$$

"area between curve and x-axis from x=0 to x=5"

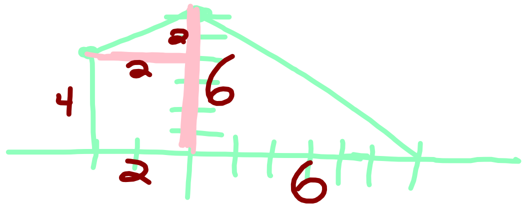


$A = \pi r^2$

Feb 13-8:51 AM

Evaluate the following integral:

$$\int_{-2}^{6} 6 - |m| \, dm$$



$2 \cdot 4 + \frac{1}{2}(2)(2) + \frac{1}{2}(6)(6)$

$8 + 2 + 18 = 28$

Feb 13-8:51 AM

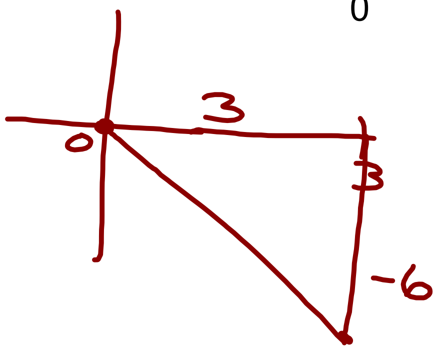
$$\int_a^b f(x)\,dx = (\text{area above the } x\text{-axis}) - (\text{area below the } x\text{-axis}).$$

$$\text{Area} = -\int_a^b f(x)\,dx \quad \text{when} \quad f(x) \le 0.$$

Feb 13-9:02 AM

Evaluate the following integral:

$$\int_0^3 -2x\,dx$$

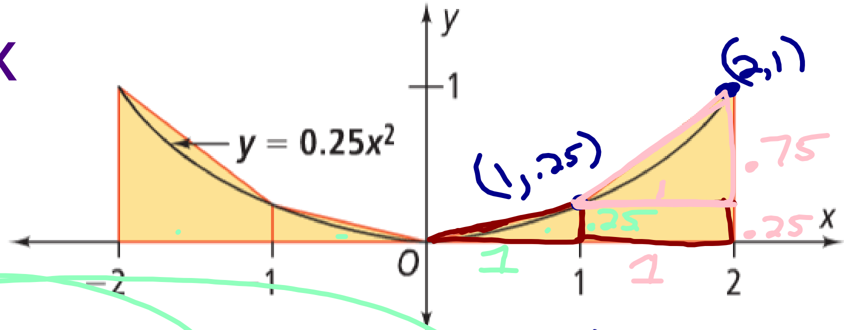


$$\frac{1}{2}(3)(-6) = -9$$

Feb 13-8:51 AM

Estimate the value of the given integral using the diagram below:

$$\int_{-2}^{2} 0.25x^2\,dx$$



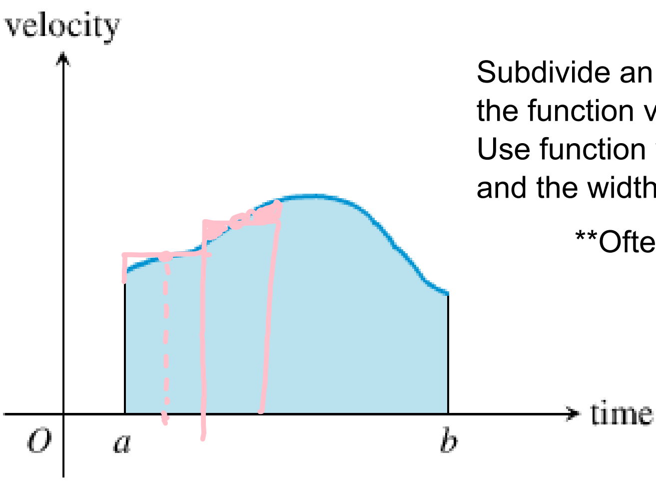
$$2\left(\frac{1}{2}(1)(.25) + .25\cdot 1 + \frac{1}{2}(1)(.75)\right)$$

$$.25 + .5 + .75$$

$$1.5$$

Apr 22-10:07 PM

Rectangular Approximation:



Subdivide an interval into n smaller intervals. Find the function value of some point in each interval. Use function value as the height of each rectangle and the width of each subdivision as the base.

**Often times width is constant

$w_1 h_1 + w_2 h_2 + w_3 h_3$

$w(h_1 + h_2 + h_3)$

Feb 2-9:10 PM

$$\boxed{\cancel{\lim_{n\to\infty}} \sum_{i=1}^{n} f(x_i)\,\Delta x =} \int_a^b f(x)\,dx$$

Upper limit of integration

The function is the **integrand.**

Integral sign

x is the **variable of integration.**

Lower limit of integration

Integral of f from a to b

When you find the value of the integral, you have **evaluated the integral.**

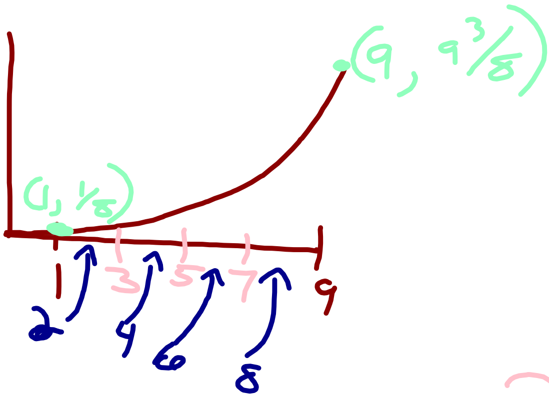
"approx" *rectangles

$f(x_1) \to$ height

$\Delta x \to$ base

Feb 13-8:39 AM

Consider the region between the curve $f(x) = {}^1/_8 x^3$ and the x-axis in the interval [1,9]. Let x_i be the midpoint of each interval. Estimate the integral using four rectangles of equal width: $\int_1^9 {}^1/_8 x^3 \, dx$



$\Delta x = 2$

$f(x_i) =$

$2(f(2)+f(4)+f(6)+f(8))$

$2(1+8+27+64)$

200

Apr 22-10:07 PM

Homework

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15 - 22 all, 26, 38a,

May 13-10:02 PM