Today, Wednesday, January 21, 2009, we discussed the integrals of the form

$$\int_{a(t)}^{b(t)} f(x)dx.$$

Here $a(t)$, $b(t)$ and $f(x)$ are given continuous functions. It is important that the ranges of the functions $a(t)$, $b(t)$ are contained in the domain of the function $f(x)$. Then

$$G(t) = \int_{a(t)}^{b(t)} f(x)dx$$

is a function of $t$. In class we proved the formula

$$G'(t) = \frac{d}{dt} \int_{a(t)}^{b(t)} f(x)dx = f\big(b(t)\big)\, b'(t) - f\big(a(t)\big)\, a'(t).$$

The functions that I used in the animation are

$$a(t) = \frac{1}{2} + \left(1 - \frac{1}{2\pi}\right) t - (1 - \cos t)$$

$$b(t) = \frac{1}{2} + \left(1 - \frac{1}{2\pi}\right) t + (1 - \cos t)$$

$$f(x) = \frac{3}{2} + \frac{3}{7} x + \sin x$$