Definite Integral

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All Riemann Sums will tend to the same limit if the partitions get closer to 0. Therefore, we can simplify the Riemann Sum notation to a definite integral notation described below.

Let f be continuous on $[a, b]$, and let $[a, b]$ be partitioned into n subintervals of equal length $\Delta x = \dfrac{b - a}{n}$. Then the definite integral of f over $[a, b]$ is given by $\lim\limits_{x \longrightarrow \infty} \sum\limits_{k=1}^{\infty} \left(f(c_k)\Delta x\right) = \int_a^b (f(x))\, dx$

**calc.(FR) 2. In the table below, $v(t)$ represents the velocity, in ft/sec, of a car traveling on a straight road.

t (sec)	0	5	10	15	20	25	30	35	40	45	50
v(t) ft/sec	0	12	20	30	55	70	78	81	75	60	72

a) Approximate $\int_0^{50} (v(t))\, dt$ with a Riemann sum, using the midpoints of five subintervals of equal length.

$\frac{b-a}{n} = \frac{50-0}{5} = 10$

$\int_0^{50} v(t)dt = 10[12 + 30 + 70 + 81 + 60]$

b) Using correct units, explain the meaning of this integral.

ft/sec · sec = ft

$\int_0^5 v(t)\,dt$ represents the total distance traveled in ft from 0 to 50 sec.