

7.1 Integral as Net Change

The definite integral of a rate of change gives the net change.

displacement:

position:

total distance:

Jan 3-7:16 AM

The velocity of a particle moving along the x-axis is given by:

$$v(t) = t^2 - \frac{8}{(t+1)^2} \quad 0 \leq t \leq 8$$

a. describe the motion of the particle:

left
right
stopped

b. Initial position $s(0) = 12$

what is the particle's position at $t = 1$? $t = 3$?

c. Find the total distance traveled from $t = 0$ to $t = 3$.

Jan 3-7:18 AM

Ex.

$$v(t) = 4 \cos(2t) \quad 0 \leq t \leq \frac{\pi}{2}$$

left
right
stopped

displacement

total distance traveled

Jan 3-7:28 AM

Integral of a rate of change gives the total accumulation.

Potato Consumption -- From 1970 to 1980 the rate of potato consumption was $C(t) = 2.2 + 1.1t$ millions of bushels per year, with t being years since the beginning of 1970. How many bushels were consumed from the beginning of 1972 to the end of 1973?

Jan 2-10:15 PM

Potato Consumption: $C(t) = 5e^{\frac{t}{10}}$

in billions of bushels per year, $t =$ years
beginning in 1990

Find the potato consumption from the beginning of 1990 to the end of 1994.

Jan 3-7:30 AM

A pump connected to a generator operates at a varying rate shown in the table. How many gallons were pumped during the hour?

Time (min)	Rate (gal/min)
0	58
5	60
10	65
15	64
20	58
25	57
30	55
35	55
40	59
45	60
50	60
55	63
60	63

Jan 3-7:43 AM

Work done by a constant force: $W = F \cdot d$

Work done by a variable force: $W = \int_a^b F(x) dx$

Hooke's Law: $F(x) = kx$

It takes a force of 9 N to stretch a spring 3 cm. How much force does it take to stretch the spring to 5 cm? How much work is done in stretching the spring to 5 cm?

Jan 3-7:43 AM