$v(t)$

$v(t)$

64   128 miles
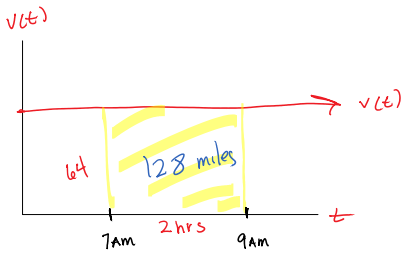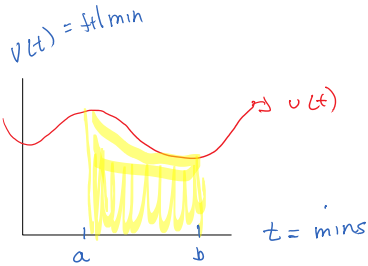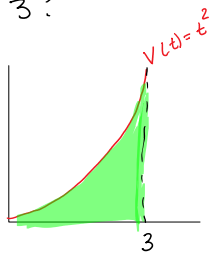
7AM   2hrs   9AM t

A train moves along at a steady rate of 64mph. from 7AM to 9AM. what is the total distance traveled during those 2 hours?

$v(t) = ft/min$

$v(t)$

$t = mins$

a b

displacement from $t=a$ to $t=b$.

Ex: starts @ $x=0$ along the x-axis w/ $v(t) = t^2$ for $t \geq 0$. where is the particle @ $t = 3$?
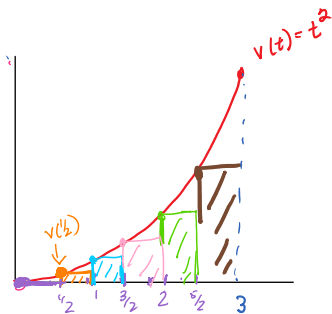
$v(t) = t^2$

3

$S(3) - S(0) = $ displacement

Use a Rectangular Approximation method (RAM).

3 types:

① Left Rect. Approx Method (LRAM) use le partitions.

$v(t) = t^2$

$v(\frac{1}{2})$

$\frac{1}{2}$ 1 $\frac{3}{2}$ 2 $\frac{5}{2}$ 3

$\Delta x = 3 - 0 = 3$

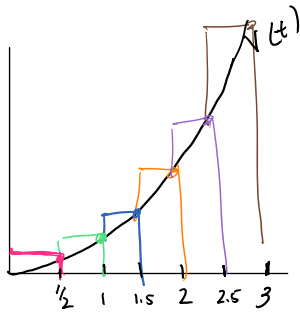$n = $ number of partitions $= 6$

$\frac{\Delta x}{n} = \frac{3}{6} = \frac{1}{2} = $ width

$LRAM_6 = \frac{1}{2} v(0) + \frac{1}{2} \cdot v(\frac{1}{2}) + \frac{1}{2} v(1) + \frac{1}{2} v(\frac{3}{2}) + \frac{1}{2} v(2) + \frac{1}{2} v(\frac{5}{2})$

$= \frac{1}{2} \left(0 + \frac{1}{4} + 1 + \frac{9}{4} + 4 + \frac{25}{4} \right)$
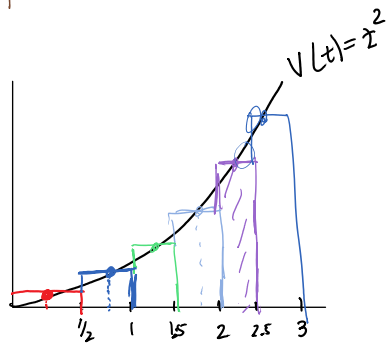
$= 6.875$

② Right Rect. Approx   RRAM₆

$$\tfrac{1}{2}V(\tfrac{1}{2}) + \tfrac{1}{2}V(1) + \tfrac{1}{2}V(1.5) + \tfrac{1}{2}V(2) + \tfrac{1}{2}V(2.5) + \tfrac{1}{2}V(3)$$

$$\tfrac{1}{2}\left(\tfrac{35}{4} + 14\right) = 11.375$$

③ midpoint Rect. Approx method   mRAM₆

$V(t) = t^2$

$$\tfrac{1}{2}\left(V(\tfrac{1}{4})\right) + \tfrac{1}{2}V(\tfrac{3}{4}) + \tfrac{1}{2}V(\tfrac{5}{4}) + \tfrac{1}{2}V(\tfrac{7}{4}) + \tfrac{1}{2}\left(\tfrac{9}{4}\right) + \tfrac{1}{2}\left(\tfrac{11}{4}\right)$$