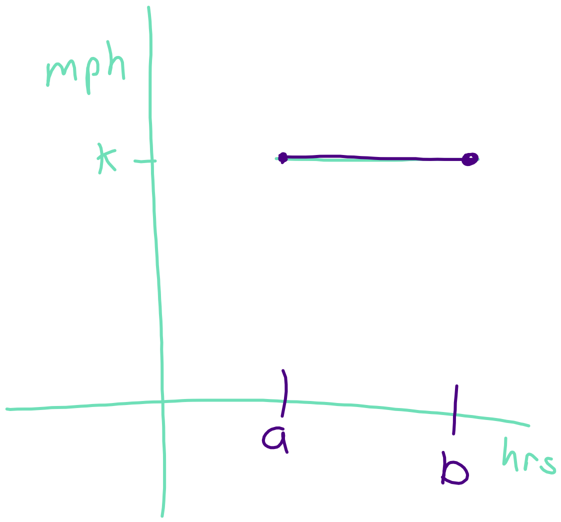
AP Calculus

Chapter 6

Section 6-1

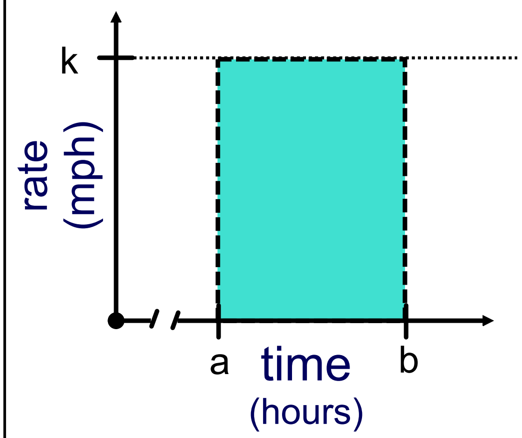
May 13-10:02 PM

A vehicle travels at a constant rate of "k" mph on the time interval [a, b]. Represent this situation graphically, plotting rate versus time.



Feb 2-8:57 PM

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

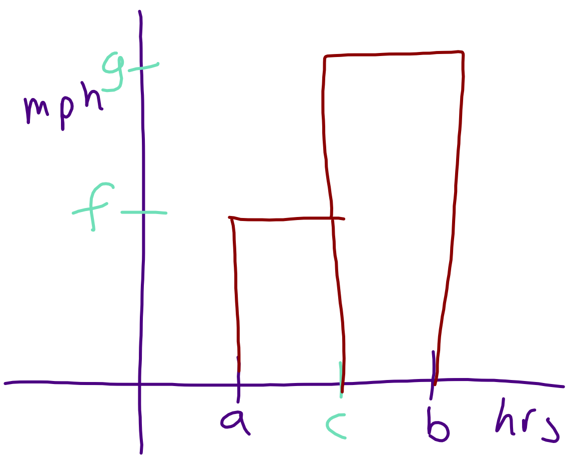


$K \cancel{\text{mph}} \cdot (b-a)\cancel{\text{hrs}} = k(b-a)\text{miles}$

$\frac{m}{hr}$

Feb 2-8:57 PM

A second vehicle travels on that same time interval [a, b]. It travels at constant rate "f " mph on [a,c] and "g " mph on (c,b]. Use graphing to determine the total distance traveled.



$g(b-c)+f(c-a)$

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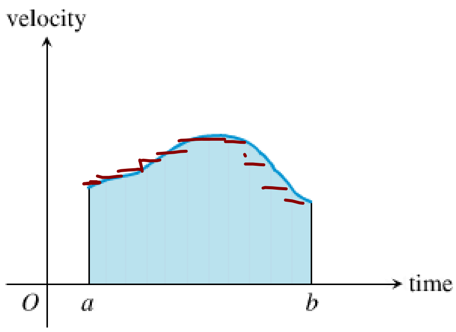
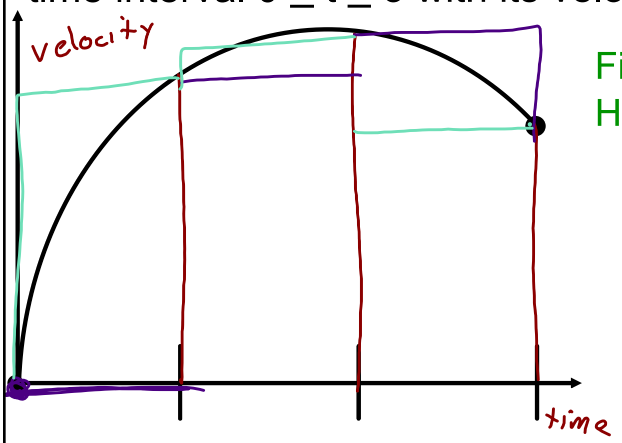
What if the velocity is not constant?

-
-
-



Feb 2-9:10 PM

A particle, starting at x = 0, travels along the x-axis during the time interval $0 \leq t \leq 3$ with its velocity given by $v(t) = 15t - 4t^2$.



Find the total distance traveled.
How could we do this?

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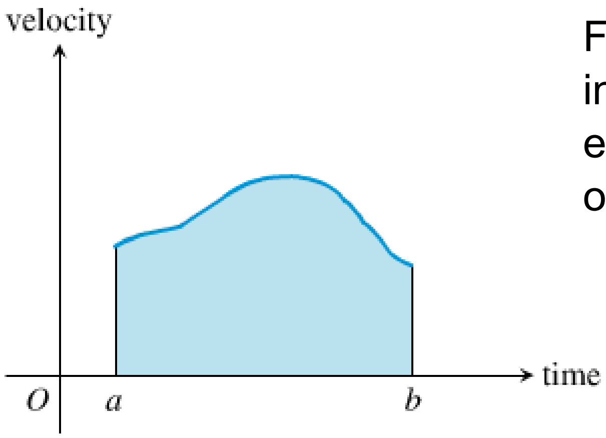
Midpoint Rectangular Approximation Method:

- *MRAM*



Find the midpoint of each interval. Use function value of each midpoint as the height of each rectangle.

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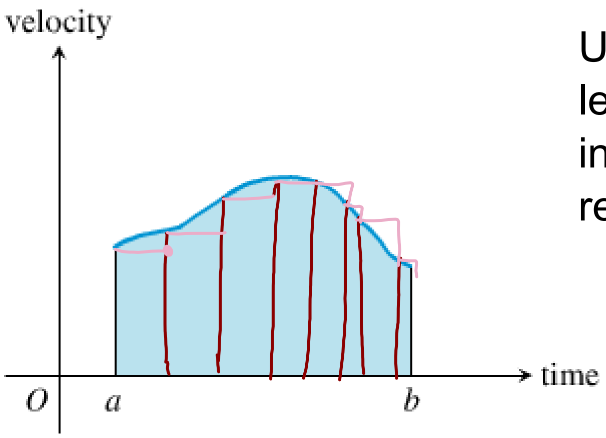
Lefthand Rectangular Approximation Method:

- *LRAM*



Use function value of the lefthand endpoint of each interval as the height of each rectangle.

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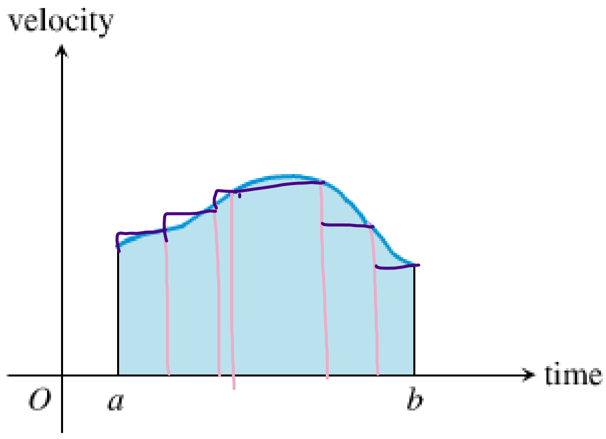
Righthand Rectangular Approximation Method:

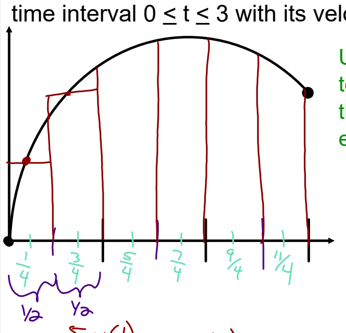
- *RRAM*



Use function value of the righthand endpoint of each interval as the height of each rectangle.

Feb 2-9:10 PM

A particle, starting at x = 0, travels along the x-axis during the time interval $0 \le t \le 3$ with its velocity given by $v(t) = 15t - 4t^2$.



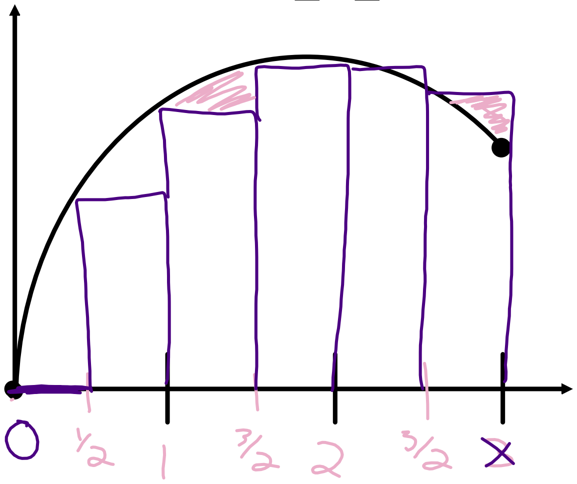
Use MRAM to approximate the total distance traveled. Divide the interval into 6 rectangles of equal length.

$.5 \cdot v(\frac{1}{4}) + .5 \cdot v(\frac{3}{4}) + .5v(\frac{5}{4}) \ldots + .5v(\frac{11}{4})$

$.5\left(v\left(\frac{1}{4}\right) + v\left(\frac{3}{4}\right) + \ldots + v\left(\frac{11}{4}\right)\right)$

Feb 2-9:44 PM

A particle, starting at x = 0, travels along the x-axis during the time interval $0 \leq t \leq 3$ with its velocity given by $v(t) = 15t - 4t^2$.

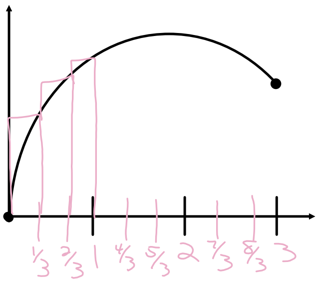


Use LRAM to approximate the total distance traveled. Divide the interval into 6 rectangles.

$$\frac{1}{2}\left(v(0)+v\left(\frac{1}{2}\right)+v(1)+\dots+v\left(\frac{3}{2}\right)\right)$$

Feb 2-9:44 PM

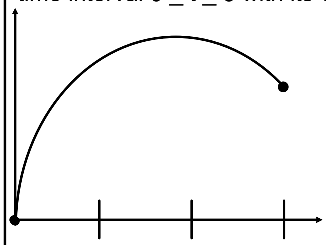
A particle, starting at x = 0, travels along the x-axis during the time interval $0 \leq t \leq 3$ with its velocity given by $v(t) = 15t - 4t^2$.



Use RRAM to approximate the total distance traveled. Divide the interval into 9 rectangles.

Feb 2-9:44 PM

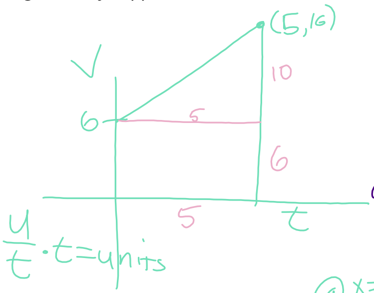
A particle, starting at x = 0, travels along the x-axis during the time interval $0 \leq t \leq 3$ with its velocity given by $v(t) = 15t - 4t^2$.



Use RRAM to approximate the total distance traveled. Divide the interval into 9 rectangles.

Feb 2-9:44 PM

A particle moves along the x-axis from x=2 at t=0 with velocity given by v(t) = 2t + 6 for $t \geq 0$. Where is the particle at t = 5?



$6 \cdot 5 + \frac{1}{2} \cdot 5 \cdot 10$

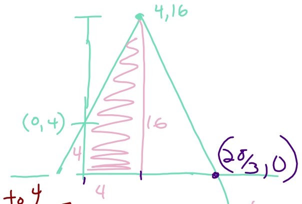
$30 + 25$

distance: 55 units

@ x = 57 @ t = 5

Feb 5-2:36 PM

A particle starting at $\boxed{x=-4}$ moves along the x-axis with velocity given by $v(t) = 16 - 3|t - 4|$ for $\boxed{t \geq 0}$. What are the particle's locations at t=4 and t=6?



$16-3|t-4|=0$

$16=3|t-4|$

$\frac{16}{3}=|t-4|$

0 to 4

$A=\frac{1}{2}(16+4)4$

40 units

@ $x=36$

4 to 6

$A=\frac{1}{2}(16)\left(\frac{16}{3}\right)$

$A=\frac{128}{3}$ units

@ $x=36+\frac{128}{3}$

$-\frac{16}{3}=t-4$ $\quad \frac{16}{3}=t-4$

$\frac{16}{3}+\frac{12}{3}=t$

Feb 5-2:36 PM

A 6000 gallon oil tanker is being filled and the rate that the oil is filling the tanker is measured every hour. The values are given in the table.

Time (h)	0	1	2	3	4
Rate (gal/h)	10	120	140	160	190
Time (h)	5	6	7	8	9
Rate (gal/h)	210	230	230	230	230

- Give upper and lower estimates for the amount of oil put into the tanker after nine hours.

L: $1(10+120+140+160+190+210+3\cdot 230)=1520$

U: $(120+140+160+190+210+4\cdot 230)=1740$

Feb 2-10:15 PM

A 6000 gallon oil tanker is being filled and the rate that the oil is filling the tanker is measured every hour. The values are given in the table.

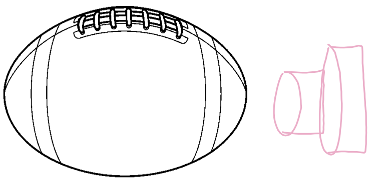
Time (h)	0	1	2	3	4
Rate (gal/h)	10	120	140	160	190
Time (h)	5	6	7	8	~~9~~
Rate (gal/h)	210	230	230	230	~~230~~

- Give a midpoint estimate for the amount of oil put into the tanker after eight hours.

$$2(120+160+210+230)=1440$$

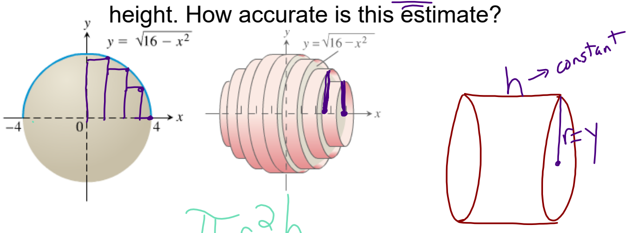
Feb 2-10:15 PM

How could we estimate the volume of an oblong 3D object (like a football) using a similar method as RAM?



Feb 5-2:36 PM

Using a right-hand cylindrical approximation, estimate the volume of a sphere of radius four. Use eight cylinders of equal height. How accurate is this estimate?



$\pi r^2 h$

$\pi 1\left(16-(-3)^2+16-(-2)^2+16-(-1)^2+\ldots+16-(4)^2\right)$

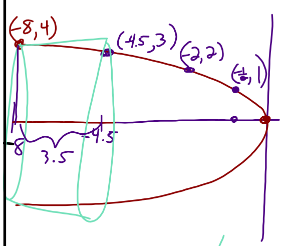
Feb 2-10:15 PM

Using a lefthand cylindrical approximation, estimate the volume of a solid made by rotating the hyperbola $y=\pm\sqrt{-2x}$ from x=-8 to x=0 around the x-axis. Use four cylinders of any height.

***figure is called a nose-cone*

$r^2 = y^2 = -2x$

$\pi r^2 h$



$\pi\left(16\cdot(3.5)+9(2.5)+4(1.5)+1(0.5)\right)$

Feb 2-10:15 PM

Homework

Pages 274 - 277

1 - 6 all, 10, 11 - 23 odd, 24, 25, 30 - 36 all

**#13 only complete problem for n=10 and n=20

May 13-10:02 PM