4.9-5.2

4.9 - Antiderivatives

Antiderivatives and Initial Value Problems

(a) $f'(x) = \sec x(\sec x + \tan x),\ f(0) = 3$

$f'(x) = \sec^2 x + \sec x \tan x$

Antiderivatives and Initial Value Problems

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$f(x) = \tan x + \sec x + c$

Antiderivatives and Initial Value Problems

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$f'(x) = \sec^2 x + \sec x \tan x$ so then
$f(x) = \tan x + \sec x + c$

$f(0) = \tan(0) + \sec(0) + c = 3$
So $c = 2$
$f(x) = \tan x + \sec x + 2$

Antiderivatives and Initial Value Problems

(d) $a(t) = -32,\ v(0) = 2,\ s(0) = 5$

Recall a(t) = v’(t) = s’’(t)

Antiderivatives and Initial Value Problems

(d) $a(t) = -32,\ v(0) = 2,\ s(0) = 5$

Recall a(t) = v'(t) = s''(t)

$v(t) = -32t + c_1$ and $v(0)=2$ so

$v(t) = -32t + 2$

$s(t) = -16t^2 + 2t + c_2$ and $s(0)=5$ so

$s(t) = -16t^2 + 2t + 5$

5.1 - Riemann Sums

Riemann Sums

(1) The velocity of an object is given by $v(t) = \frac{1}{5t}$ on the time interval $1 \leq t \leq 7$. Approximate the displacement of the object using $n = 3$ subintervals with left endpoints, right endpoints, and midpoints.

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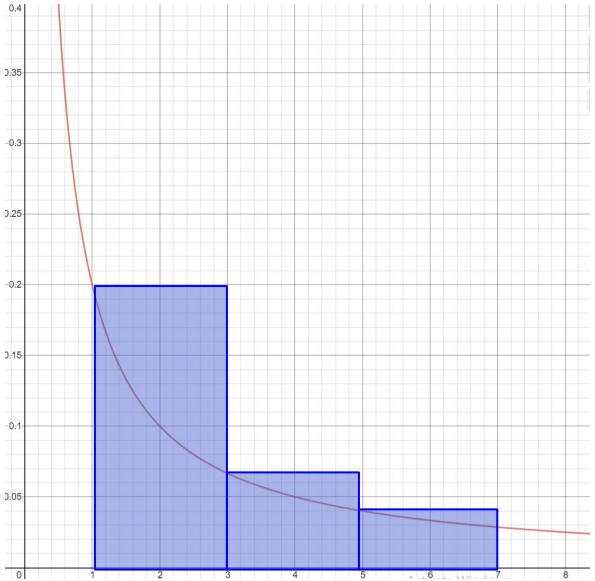

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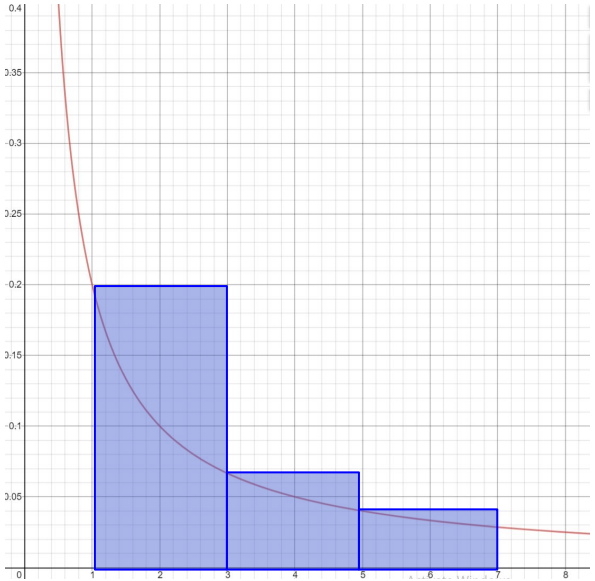
width of each box:

(b-a)/n

(7-1)/3 = 2

starting point options:

(1, 3, 5, 7)



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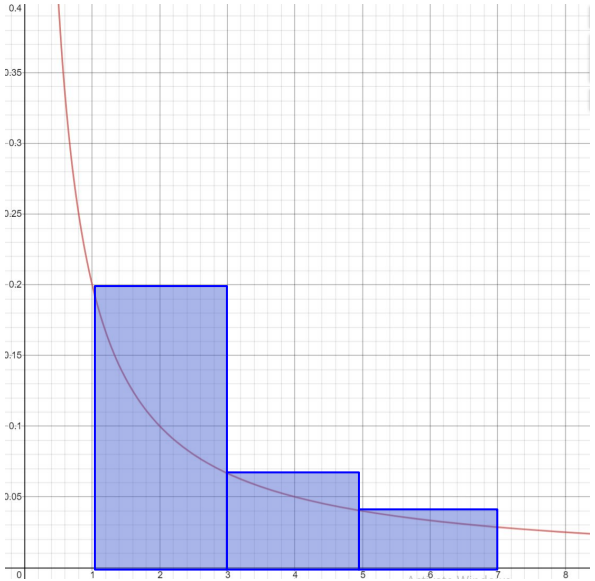
starting point options:

(1, 3, 5, 7)

"Displacement" = change in s(t)

= 2* (v(1) + v(3) + v(5))

= 2*(⅕) + 2*(1/15) + 2*(1/25)



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width of each box:

(b-a)/n

(7-1)/3 = 2

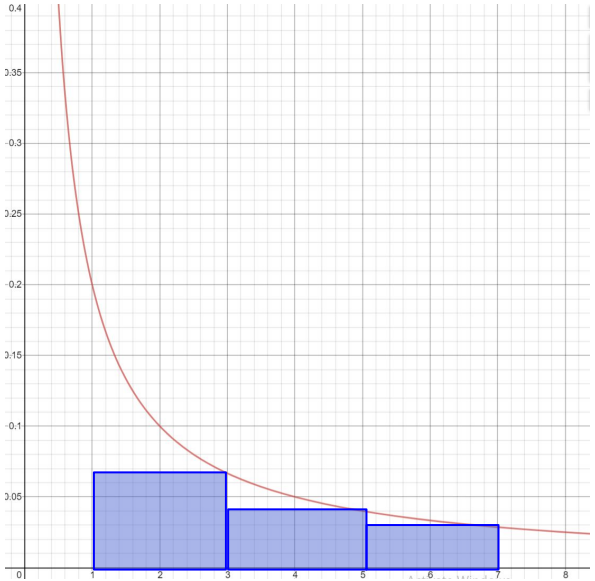
starting point options:

(1, 3, 5, 7)

“Displacement” = change in s(t)

= 2* (v(3) + v(5) + v(7))

= 2*(1/15) + 2*(1/25) + 2*(1/35)



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width of each box:

(b-a)/n

(7-1)/3 = 2

starting point options:

(1, 3, 5, 7)

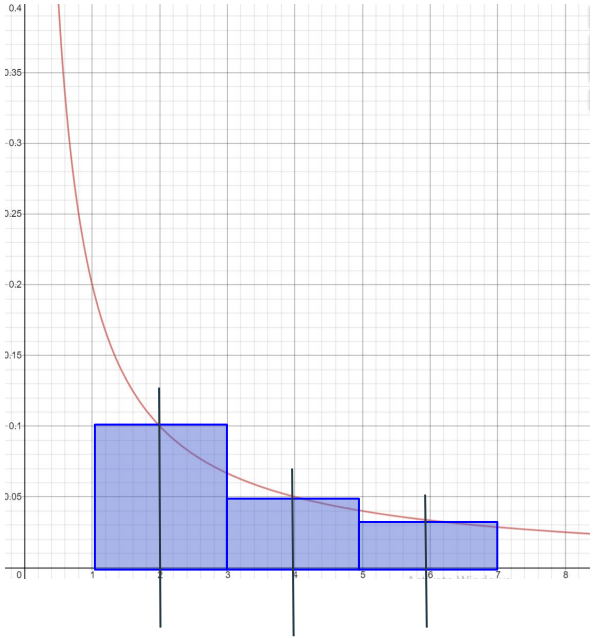
for midpoint, take the middle of these:

(2,4,6)

"Displacement" = change in s(t)

= 2* (v(2) + v(4) + v(6))

= 2*(1/10) + 2*(1/20) + 2*(1/30)



5.2 - Definite Integrals

Definite Integrals using Geometry

The velocity of an object is defined by v(t) = 5 m/sec . Determine the displacement over 5<t<10 sec

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Since my velocity is constant, all I'm asking is how far you'd travel in 5 seconds

Displacement = (5 m/sec)*5 seconds = 25m

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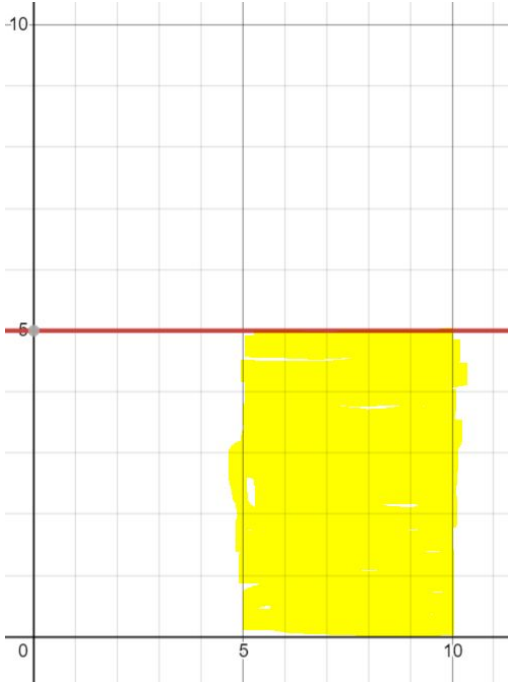


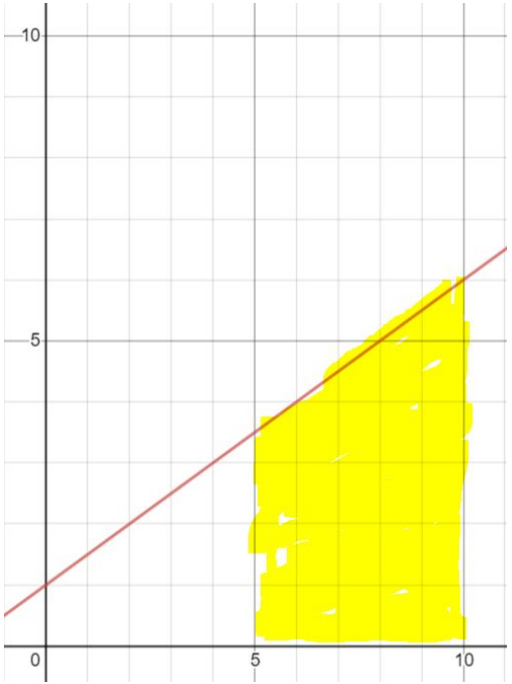
Since my velocity is constant, all I'm asking is how far you'd travel in 5 seconds

Displacement = (5 m/sec)*5 seconds = 25m

v(t) = 5
change is s = s(10)-s(5) = 25m

Definite Integrals using Geometry

The velocity of a car is defined by v(t) = t/2 +1 m/sec. Determine the displacement over 5<t<10 sec



Displacement = Area of the yellow highlighted area

= 3.5*5 + (2.5*5).5

= 17.5 + 6.25= 23.75 meters