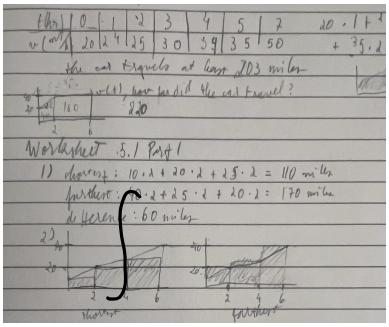
Section 5.1 How we measure distance traveled? (Part 1)

Area under the curve

P 1. Suppose a car is moving with increasing velocity along a straight road. Use the following data to answer the question.

$t(mi)$	0	2	4	6
$v(mi/h)$	10	20	25	40



1. What is the shortest distance the car traveled?
2. What is the furthest the car could have traveled?
3. What is the difference between the two distances?

P 2. Plot the graphs of the previous problems.

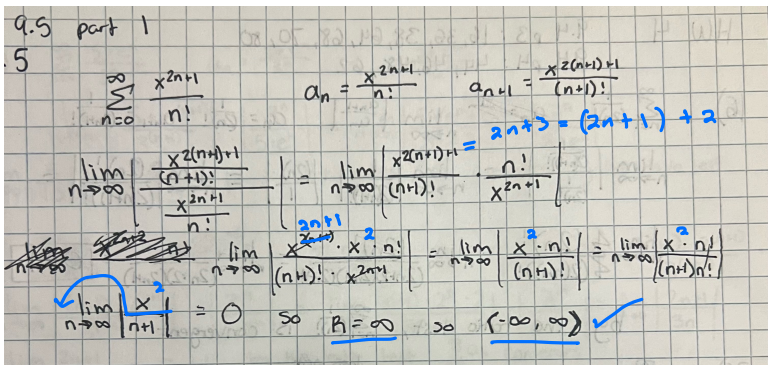
P 3. With time t in hours, the velocity of a car, in miles per hour, is given by $v(t) = 5t$. How far does the car travel in 3 hours?

Theorem: radius of convergence

Consider the series $\sum_{n=0}^{\infty} C_n(x-a)^n$ where R is the radius of convergence and $a_n = C_n(x-a)^n$. Then

1. If $\lim_{n\to\infty} |\frac{a_{n+1}}{a_n}|$ is infinite then $R = 0$.
2. If $\lim_{n\to\infty} |\frac{a_{n+1}}{a_n}| = 0$ then $R = \infty$.
3. If $\lim_{n\to\infty} |\frac{a_{n+1}}{a_n}| = K|x-a|$ where K is a positive number then $R = \frac{1}{K}$.

P 5. Determine the interval of convergence of the series $\sum_{n=0}^{\infty} \frac{x^{2n+1}}{n!}$.



5.1

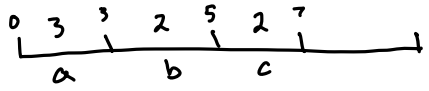
d - distance v - velocity t - time

$d = vt$ $v = \frac{d}{t}$ $t \neq 0$

Ex: Suppose a car is moving with increasing velocity along a straight path.

t (h)	0	3	5	7
v mi/h	20	30	35	50

What is the minimum number of miles the car has travel?



$t = 3$ $20 \text{ mi/h} \cdot 3 \text{ h} = 20 \cdot 3 \text{ mi}$ for a

$t = 5$ $30 \text{ mi/h} \cdot 2 \text{ h} = 30 \cdot 2 \text{ mi}$ for b

$t = 7$ $35 \text{ mi/h} \cdot 2 \text{ h} = 35 \cdot 2 \text{ mi}$ for c

a + b + c the car travels at least miles.

$20 \cdot 3 + 30 \cdot 2 + 35 \cdot 2$

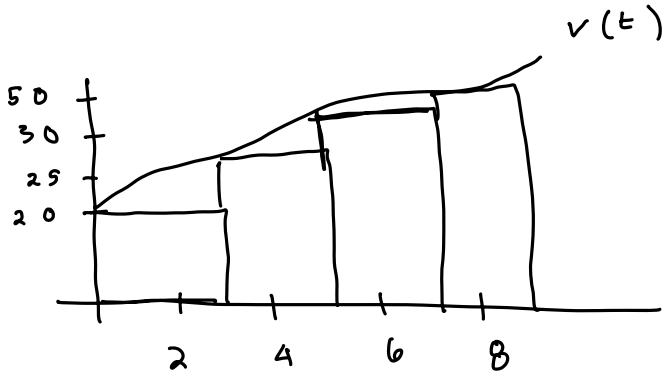
$= 60 + 60 + 70$

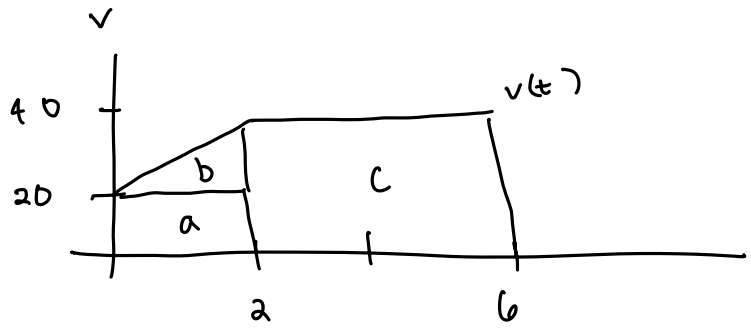
$= 190 \text{ mi}$

t (h)	0	1	2	3	4	5	7
v (mi/h)	20	24	25	30	34	35	50

$20 \cdot 1 + 24 \cdot 1 + 25 \cdot 1 + 30 \cdot 1 + 34 \cdot 1 + 35 \cdot 2$ miles

$\therefore$ The car travels at least $169 + 34 = 203$ miles.





How far did the car travel?

$20 \cdot 2 + (20 \cdot 2)/2 + 40 \cdot 4$ mi

a b

t