$\therefore S_K = \sum_{K=1}^{n} a_K$

$S_1 = a_1$

$S_2 = a_1 + a_2$

$S_3 = a_1 + a_2 + a_3$

$S_4 = a_1 + a_2 + a_3 + a_4$

now $S_2 - S_1 = a_2 + a_1 - a_1 = a_2$

$a_2 = S_2 - S_1$

similarly $a_3 = S_3 - S_2$

$a_4 = S_4 - S_3$

$\vdots$

$a_n = S_n - S_{n-1}$

now $t_n = \sum_{K=2}^{n} \frac{a_K}{S_{K-1} S_K}$

$t_n = \frac{a_2}{S_1 S_2} + \frac{a_3}{S_2 S_3} + \frac{a_4}{S_3 S_4} + \cdots + \frac{a_n}{S_{n-1} S_n}$

$= \left(\frac{S_2 - S_1}{S_1 S_2}\right) + \left(\frac{S_3 - S_2}{S_2 S_3}\right) + \left(\frac{S_4 - S_3}{S_3 S_4}\right) + \cdots \left(\frac{S_n - S_{n-1}}{S_{n-1} S_n}\right)$

$$S_n = \sum_{k=1} a_k =$$

$$t_n = \sum_{k=2}^{n} \frac{a_k}{S_{k-1} S_k}$$

$$= \frac{a_2}{S_1 S_2} + \frac{a_3}{S_2 S_3} + \frac{a_4}{S_3 S_4} + \frac{a_5}{S_4 S_5} + \cdots + \frac{a_n}{S_{n-1} S_n}$$

$$= \left(\frac{1}{S_1} - \frac{1}{S_2}\right) a_2 + \left(\frac{1}{S_2} - \frac{1}{S_3}\right) a_3 + \left(\frac{1}{S_3} - \frac{1}{S_4}\right) a_4 + \cdots + \left(\frac{1}{S_{n-1}} - \frac{1}{S_n}\right) a_n$$

$$= \left(\frac{S_2 - S_1}{S_1 S_2}\right) a_2 + \left(\frac{S_3 - S_2}{S_2 S_3}\right) a_3 + \left(\frac{S_4 - S_3}{S_3 S_4}\right) a_4 + \cdots$$

$$t_n = \left(\frac{1}{S_1} - \cancel{\frac{1}{S_2}}\right) + \left(\cancel{\frac{1}{S_2}} - \cancel{\frac{1}{S_3}}\right) + \left(\cancel{\frac{1}{S_3}} - \cancel{\frac{1}{S_4}}\right) + \cdots + \left(\cancel{\frac{1}{S_{n-1}}} - \frac{1}{S_n}\right)$$

$$= \frac{1}{S_1} - \frac{1}{S_n}$$

$\because \sum a_n$ is divergent then $S_n = \sum a_k$ is also divergent

$$\lim_{n\to\infty} \frac{1}{S_n} = \frac{1}{\infty} = 0$$

$$\lim_{n\to\infty} t_n = \lim_{n\to\infty}\left(\frac{1}{S_1} - \frac{1}{S_n}\right)$$

$$= \frac{1}{S_1} - 0$$

$$= \frac{1}{a_1}$$