

$$S = \left\{ \frac{1}{2^m} + \frac{1}{n} \mid m, n \in \mathbb{N} \right\}$$

→ fix $m=1$, and vary n

then $\lim_{n \rightarrow \infty} \frac{1}{2} + \frac{1}{n} = \boxed{\frac{1}{2}}$

→ fix $m=2$, and vary n

then $\lim_{n \rightarrow \infty} \frac{1}{4} + \frac{1}{n} = \boxed{\frac{1}{4}} \text{ or } \boxed{\frac{1}{2^2}}$

⋮
Doing in this way

$$S' = \left\{ \frac{1}{2}, \frac{1}{2^2}, \frac{1}{2^3}, \dots, \frac{1}{2^n} \right\} \quad \text{--- (i)}$$

→ fix $n=1$ and vary m

$\lim_{m \rightarrow \infty} 1 + \frac{1}{2^m} = \boxed{1}$

→ fix $n=2$ and vary m

$\lim_{m \rightarrow \infty} \frac{1}{2} + \frac{1}{2^m} = \boxed{\frac{1}{2}}$

⋮
Doing in this way

$$S' = \left\{ 1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \dots \right\} \quad \text{--- (ii)}$$

from (i) & (ii)

$$S' = \left\{ 1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \dots \right\} \cup \{0\} \rightarrow \left[\begin{array}{l} \text{if } m \text{ or } n \text{ both} \\ \text{vary} \end{array} \right]$$