

北一女中 102 學年度《數戰數決》有獎徵答活動

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題號：5-2 頁碼/總頁數：_____ (如果只有一頁，可不填)

$$\text{設 } A = \frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{2014}$$

$$B = \frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{1007}$$

$$S = \frac{1}{1} \times \frac{1}{2} + \frac{1}{3} \times \frac{1}{4} + \dots + \frac{1}{2013} \times \frac{1}{2014}$$

$$= \frac{1}{1} - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \dots + \frac{1}{2013} - \frac{1}{2014}$$

$$= \frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{2014} - 2 \cdot \frac{1}{2} \left(\frac{1}{1} + \frac{1}{2} + \dots + \frac{1}{1007} \right)$$

$$= A - B$$

$$T = \frac{1}{1008} \times \frac{1}{2014} + \frac{1}{1009} \times \frac{1}{2013} + \dots + \frac{1}{2014} \times \frac{1}{1008}$$

$$= \frac{1}{1008+2014} \left(\frac{1}{1008} + \frac{1}{2014} \right) + \frac{1}{1009+2013} \left(\frac{1}{1009} + \frac{1}{2013} \right) + \dots + \frac{1}{2014+1008} \left(\frac{1}{2014} + \frac{1}{1008} \right)$$

$$= \frac{2}{3022} \left(\frac{1}{1008} + \frac{1}{1009} + \dots + \frac{1}{2014} \right)$$

$$= \frac{1}{1511} (A - B)$$

$$\Rightarrow \frac{S}{T} = \frac{A - B}{\frac{1}{1511}(A - B)} = 1511$$