

$$A = \frac{54 \cdot 107 - 53}{53 \cdot 107 + 54} \quad ; \quad B = \frac{135 \cdot 269 - 133}{134 \cdot 269 + 135}$$

Đáp án: Ta có : $A = \frac{(53+1) \cdot 107 - 53}{53 \cdot 107 + 54} = \frac{53 \cdot 107 + 107 - 53}{53 \cdot 107 + 54} = \frac{53 \cdot 107 + 54}{53 \cdot 107 + 54} = 1$

$$B = \frac{(134+1) \cdot 269 - 133}{134 \cdot 269 + 135} = \frac{134 \cdot 269 + 269 - 133}{134 \cdot 269 + 135} = \frac{134 \cdot 269 + 136}{134 \cdot 269 + 135} > 1$$

Do đó: $A < B$.

Câu 2: So sánh $A = \frac{10^{11} - 1}{10^{12} - 1}$ & $B = \frac{10^{10} + 1}{10^{11} + 1}$?

Đáp án:

Chứng minh bài toán phụ nếu $\frac{a}{b} < 1$ thì $\Rightarrow \frac{a}{b} < \frac{a+n}{b+n} (n \in \mathbb{N}^*)$

Thật vậy:

$$\frac{a}{b} < 1 \Rightarrow a < b \Rightarrow a \cdot n > b \cdot n \Rightarrow a \cdot b + a \cdot n < a \cdot b + b \cdot n \Rightarrow a \cdot (b+n) < b \cdot (a+n)$$

$$\Rightarrow \frac{a(b+n)}{b(b+n)} < \frac{b(a+n)}{b(b+n)} \Rightarrow \frac{a}{b} < \frac{a+n}{b+n} (n \in \mathbb{N}^*)$$

Áp dụng: Ta có : $A = \frac{10^{11} - 1}{10^{12} - 1} < 1$ (vì tử < mẫu)

$$\Rightarrow A = \frac{10^{11} - 1}{10^{12} - 1} < \frac{(10^{11} - 1) + 11}{(10^{12} - 1) + 11} = \frac{10^{11} + 10}{10^{12} + 10} = \frac{10^{10} + 1}{10^{11} + 1} = B$$

Vậy $A < B$.

Câu 3: So sánh $M = \frac{2017}{2018} + \frac{2018}{2019}$

$$N = \frac{2017 + 2018}{2018 + 2019}$$

Đáp án:

$$\text{Ta có : } \left. \begin{array}{l} \frac{2017}{2018} > \frac{2017}{2018+2019} \\ \frac{2018}{2019} > \frac{2018}{2018+2019} \end{array} \right\} \text{ Cộng vế với vế}$$

$$\Rightarrow M > N$$

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