PP43155

ROVSEN PIRGULIYEV - AZERBAIJAN

Prove without softs:

$$e^{\pi-e} > \frac{\pi-1}{e-1}$$

Solution by Daniel Sitaru, Claudia Nănuţi.

$$\text{Let be } f:(1,\infty)\to\mathbb{R}; f(x)=x-\log(x-1)$$

$$f'(x)=1-\frac{1}{x-1}; f''(x)=\frac{1}{(x-1)^2}>0$$

$$f(x)=\frac{x-2}{x-1}; f'(x)=0 \Rightarrow x=2 \text{ critical point}$$

$$f \text{ increasing on } (2,\infty)$$

$$2<e<\pi \Rightarrow f(e)<f(\pi)$$

$$e-\log(e-1)<\pi-\log(\pi-1)$$

$$\pi-e>\log(\pi-1)-\log(e-1)$$

$$\log e^{\pi-e}>\log\left(\frac{\pi-1}{e-1}\right)$$

$$e^{\pi-e}>\frac{\pi-1}{e-1}$$

□

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