An example of $\tan\dfrac{\pi}{2}=0$ from Seiyō Sampō

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Abstract. We show a very simple and pleasant example $\tan\frac{\pi}{2}=0$ from Seiyō Sampō.

Keywords. $\frac{1}{0}=\frac{0}{0}=0$, $\tan\frac{\pi}{2}=0$, Wasan.

Mathematics Subject Classification (2010). 01A27, 51M04

1. Introduction

For an isosceles triangle ABC with base BC, let r be the fixed radius of the excircle touching BC from the side opposite to A (see Figure 1). If $2a=|BC|$ and $2\theta=\angle BAC$, then we have

$$\tan\theta=\frac{r}{2a}-\frac{a}{2r}. \tag{1}$$

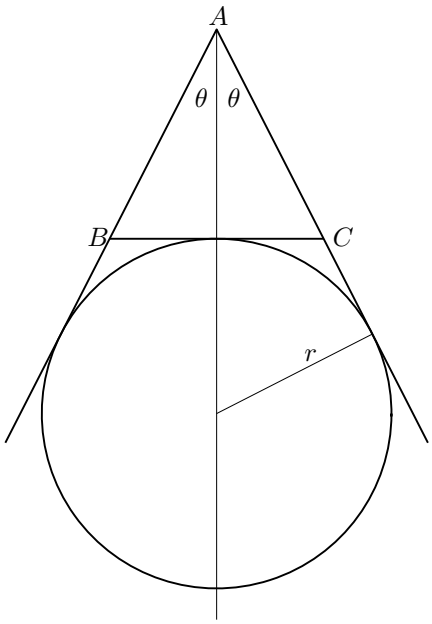

Figure 1.

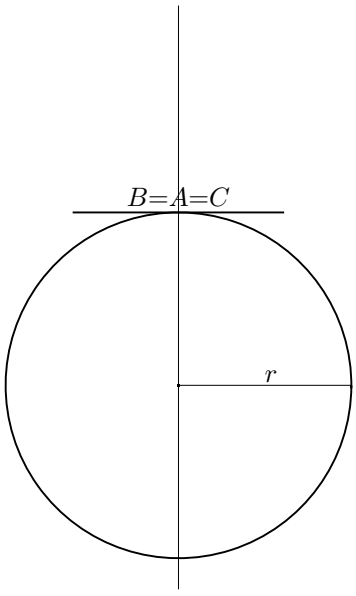

Figure 2.

The fact is obtained as a special case from the results in Wasan (traditional Japanese mathematics in the Edo period) recorded in Seiyō Sampō written by Sadasuke Fujita ([1]).

Now we consider the case in which the point A lies on the side BC. Then we have the desired result (see Figure 2):

$$\theta = \frac{\pi}{2}$$

and

$$\tan\frac{\pi}{2} = \frac{r}{0} - \frac{0}{2r} = 0,$$

since

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

([2]).

Acknowledgement

The authors are gathering examples on the division by zero and division zero calculus, and the result is listed as No. 1314 on 25th August 2024.

References

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[2] S. Saitoh, Introduction to the Division by Zero Calculus, 2021, Scientific Research Publ., Inc..