Proposed solution of problem 1126
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Find a rational function $f(x)$ with integer coefficient such that

$$\cos\theta = f(\sin\theta - \cos\theta)$$

is an identity or prove that no identity of this form exists

Proof No identity of the given form can exist because $\sin\theta - \cos\theta = 1$ for $\theta_1 = \dfrac{\pi}{2}$ and $\theta_2 = \pi$ but $\cos\pi = -1$ while $\cos\dfrac{\pi}{2} = 0$.