NMU Math & CS Department

Problem of the Month, April 2023

The trigonometric identity:

$$\boxed{\cos(2a) = \cos^N(a) - \sin^N(a) \quad \text{for all } a \in \mathbb{R}}$$

only holds for very special integers $N \in \mathbb{Z}$.

Find the special values of $N \in \mathbb{Z}$ that make the identity true, and show they are the only ones.