Problem 11: Let ω be a primitive 13th root of unity. Evaluate $(1 - \omega)(1 - \omega^2) \cdots (1 - \omega^{12})$.

(Source: AoPS Precalculus)

We have $x^{13} - 1 = (x - 1)(x^{12} + x^{11} + \cdots + x + 1)$.

The roots of $x^{13} - 1$ are the 13th roots of unity, $1, \omega, \omega^2, \ldots, \omega^{12}$.

Thus the roots of $x^{12} + x^{11} + \cdots + x + 1$ are $\omega, \omega^2, \ldots, \omega^{12}$.

This means that $(x - \omega)(x - \omega^2) \cdots (x - \omega^{12}) = x^{12} + x^{11} + \cdots + x + 1$.

Plugging in 1 for x, we get

$$(1 - \omega)(1 - \omega^2) \cdots (1 - \omega^{12}) = \boxed{13}$$