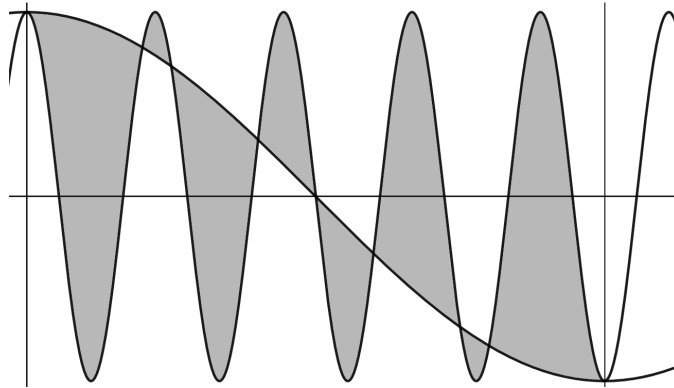**Proposed Problem.**
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PROBLEM:
Shown here is the area between $\cos x$ and $\cos 9x$ over the interval $[0, \pi]$.

For any fixed integer $n > 1$, write the area between $\cos x$ and $\cos nx$ over $[0, \pi]$ in terms of just two cotangents. Then, find the limit of that area as $n \to \infty$.