$$A = \cos(x)\cos(2x)\cdots\cos(2^n x).$$

1. $\sin x \neq 0, \sin x,$

$\sin(x)A$

$= \sin(x)\cos(x)\cos(2x)\cdots\cos(2^n x)$

$= \frac{1}{2}\sin(2x)\cos(2x)\cdots\cos(2^n x)$

$= \frac{1}{2^2}\sin(4x)\cdots\cos(2^n x)$

$= \frac{1}{2^{n+1}}\sin(2^{n+1} x)$

$A = \frac{\sin(2^{n+1} x)}{2^{n+1}\sin x}.$

$n \to \infty, \sin(2^{n+1} x), \; -1 \leq \sin(2^{n+1} x) \leq 1.$

$\bigtriangledown \lim_{n \to \infty} \frac{1}{2^{n+1}} = 0, \; \sin x \neq 0,$

$\lim_{n \to \infty} A = 0.$

$x = 2k\pi,$