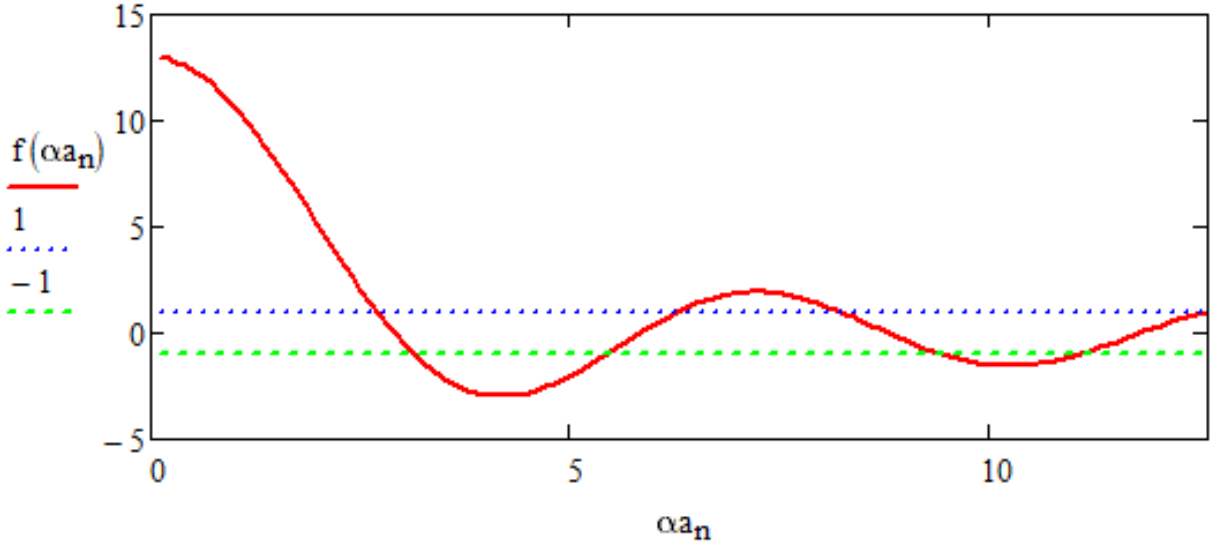
3.5 (*a*) Plot the function $f(\alpha a) = 12(\sin \alpha a)/\alpha a + \cos \alpha a$ for $0 \le \alpha a \le 4\pi$. Also, given the function $f(\alpha a) = \cos ka$, indicate the allowed values of αa that will satisfy this equation. (*b*) Determine the values of αa at (*i*) $ka = \pi$ and (*ii*) $ka = 2\pi$.

Using MathCad

a) $f(aa) := \dfrac{12 \cdot \sin(aa)}{aa} + \cos(aa)$ $\quad n := 1 .. 120$ $\quad \alpha a_n := \dfrac{4 \cdot \pi \cdot n}{120}$

Since -1<= cos(ka) <= 1, plot horizontal lines at +1 & -1



By zooming in on plot & trial-and-error, find αa bands where 1<=*f*(αa) <= -1.

first band of αa	$f(0.859152\pi) = 1$	to	$f(\pi) = -1$
second band of αa	$f(1.729352\pi) = -1$	to	$f(2\pi) = 1$
third band of αa	$f(2.617537\pi) = 1$	to	$f(3\pi) = -1$
fourth band of αa	$f(3.525489\pi) = -1$	to	$f(4\pi) = 1$

b)

(i) Since $\cos(ka = \pi) = -1$,
the values αa w/in the range are: **π, 1.729352π, 3π, & 3.525489π.**

(ii) Since $\cos(ka = 2\pi) = 1$,
the values αa w/in the range are: **0.859152π, 2π, 2.617537π, &**