$\Leftrightarrow \cos\theta + \cos 2\theta + \cos 4\theta + \cos 8\theta = x$

$\cos^2\theta + \cos^2 2\theta + \cos^2 4\theta + \cos^2 8\theta$

$= \dfrac{1+\cos 2\theta}{2} + \dfrac{1+\cos 4\theta}{2} + \dfrac{1+\cos 8\theta}{2} + \dfrac{1+\cos 16\theta}{2}$

$= 2 + \dfrac{1}{2}\left(\cos 2\theta + \cos 4\theta + \cos 8\theta + \cos 16\theta\right)$

$= 2 + \dfrac{1}{2}\left(\cos 2\theta + \cos 4\theta + \cos 8\theta + \cos\theta\right)$

$2\cos\theta\cos 2\theta + 2\cos\theta\cos 4\theta + 2\cos\theta\cos 8\theta + 2\cos 2\theta\cos 4\theta + 2\cos 2\theta\cos 8\theta + 2\cos 4\theta\cos 8\theta$

$= \left(\cos\theta + \cos 3\theta\right) + \left(\cos 3\theta + \cos 5\theta\right) + \left(\cos 7\theta + \cos 9\theta\right) + \left(\cos 2\theta + \cos 6\theta\right) + \left(\cos 6\theta + \cos 10\theta\right) + \left(\cos 4\theta + \cos 12\theta\right)$

$= \left(\cos\theta + \cos 3\theta\right) + \left(\cos 14\theta + \cos 5\theta\right) + \left(\cos 7\theta + \cos 9\theta\right) + \left(\cos 2\theta + \cos 6\theta\right) + \left(\cos 11\theta + \cos 10\theta\right) + \left(\cos 4\theta + \cos 12\theta\right)$

$= -\left(\cos 0 + \cos 8\theta + \cos 13\theta + \cos 15\theta + \cos 16\theta\right)$

$= -\left(1 + \cos 8\theta + \cos 4\theta + \cos 2\theta + \cos\theta\right)$

$x^2 = 2 + \dfrac{1}{2}x - \left(1+x\right)$

$2x^2 + x - 2 = 0$

$x = \dfrac{-1 \pm \sqrt{17}}{4}\ (負不合)$