Masalah Syarat Batas

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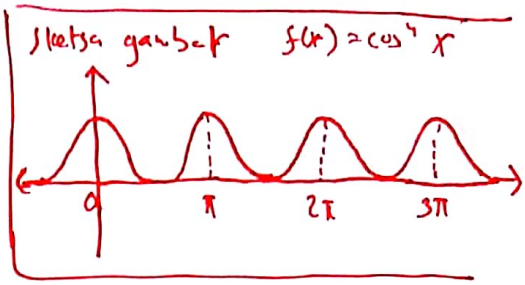
C. Latihan 1

A. Selesaikan lah soal berikut ini!

1.) Tentukan periode $f(x) = \cos^4 x$

Sketsa gambar $f(x) = \cos^4 x$



Penyelesaian

Note that

$\Rightarrow f(x+\pi) = \cos^4(x+\pi)$

$= [\cos(x+\pi)]^4$

$= [(\cos x \cdot \cos\pi) - (\sin x \cdot \sin\pi)]^4$

$= [(\cos x \cdot (-1)) - (\sin x \cdot 0)]^4$

$= [(-\cos x) - (0)]^4$

$= [-\cos x]^4$

$= \cos^4 x = f(x)$

$\Rightarrow f(x+2\pi) = \cos^4(x+2\pi)$

$= [\cos(x+2\pi)]^4$

$= [(\cos x \cdot \cos 2\pi) - (\sin x \cdot \sin 2\pi)]^4$

$= [(\cos x \cdot (1)) - (\sin x \cdot (0))]^4$

$= [\cos x]^4$

$= \cos^4 x = f(x)$

$\Rightarrow f(x+3\pi) = \cos^4(x+3\pi)$

$= [\cos(x+3\pi)]^4$

$= [(\cos x \cdot \cos 3\pi) - (\sin x \cdot \sin 3\pi)]^4$

$= [(\cos x \cdot (-1)) - (\sin x \cdot (0))]^4$

$= [-\cos x]^4$

$= \cos^4 x = f(x)$

$\cos 3\pi = \cos(\pi + 2\pi)$
$= \cos((\pi) + 2k\pi)$, $k \in \mathbb{Z}$
$= \cos\pi$
$= -1$

$\sin 3\pi = \sin(\pi + 2\pi)$
$= \sin((\pi) + 2k\pi)$, $k \in \mathbb{Z}$
$= \sin\pi$
$= 0$

$\therefore$ Karena, nilai positif terkecil p dalam $f(x+p) = f(x)$ disebut periode terkecil. atau disingkat periode $f(x)$. Maka, periode $f(x) = \cos^4 x$ adalah π.