Γράφημα $f(x) = \sin x$, $x \in \mathbb{R}$

$f(x) = \sin x$, $x \in \mathbb{R}$

$\sin^2 x + \cos^2 x = 1$

$\Rightarrow \sin^2 x \le \sin^2 x + \cos^2 x = 1$

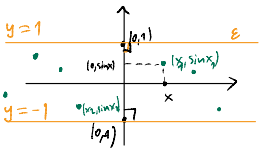
$\Leftrightarrow (0 \le) \sin^2 x \le 1$

$\Rightarrow \sqrt{\sin^2 x} \le \sqrt{1}$

$\Rightarrow |\sin x| \le 1$

$\Rightarrow -1 \le \sin x \le 1$

$-1 \le \sin x \le 1$



$(x, \sin x)$ $x \in \mathbb{R}$

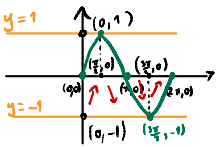
$f(x) = \sin x$, $0 \le x \le 2\pi$

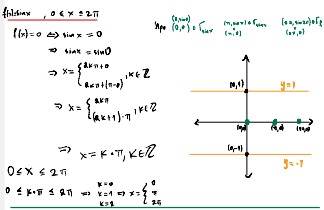
$[0, \frac{\pi}{2}]$: ↑ increasing

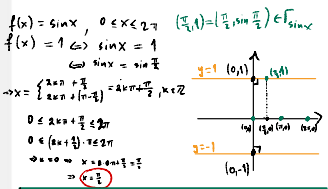
$[\frac{\pi}{2}, \pi]$: ↓ decreasing

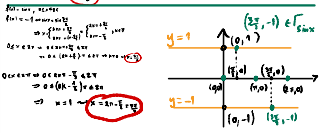
$[\pi, \frac{3\pi}{2}]$: ↓ decreasing

$[\frac{3\pi}{2}, 2\pi]$: ↑ increasing





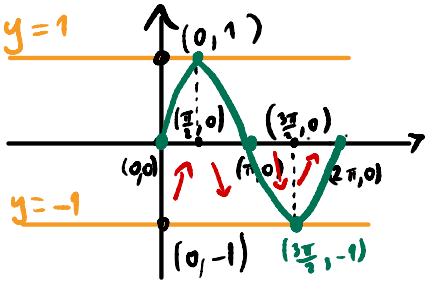




Made with Goodnotes

$f(x) = \sin x$, $0 \le x \le 2\pi$

Γράφημα:



$f(x) = \sin x$, $2\pi \le x \le 4\pi$

① $f(x) = \sin x$ είναι περιοδική συνάρτηση $f(x+2\pi) = f(x)$, $\forall x \in \mathbb{R}$

Απόδειξη:

$f(x+2\pi) = \sin(x+2\pi)$

$= \sin[(x+\pi)+\pi)$ ②

$= -\sin(x+\pi)$ ③

$= -(-\sin x)$ ④

$= \sin x$

$= f(x)$

① $\sin(y+2\pi) = \sin y$

② $\sin(y+\pi) = -\sin y$

③ $\sin(x+\pi) = -\sin x$

④ $-(-\sin x) = \sin x$

$\sin(2\pi) \overset{①}{=} \sin 0 = 0$

$\sin\left(\frac{5\pi}{2}\right) \overset{①}{=} \sin\frac{\pi}{2} = 1$

$\sin(3\pi) \overset{①}{=} \sin\pi = 0$

$\sin\left(\frac{7\pi}{2}\right) \overset{①}{=} \sin\left(\frac{3\pi}{2}\right) = -1$

$\sin(4\pi) \overset{①}{=} \sin(2\pi) = 0$

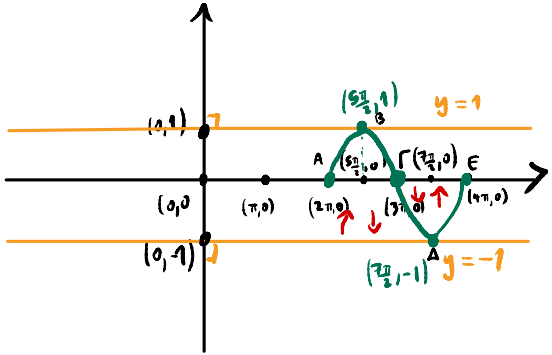
$A = (2\pi, 0) \in \Gamma_{\sin x}$

$B = \left(\frac{5\pi}{2}, 1\right) \in \Gamma_{\sin x}$

$\Gamma = (3\pi, 0) \in \Gamma_{\sin x}$

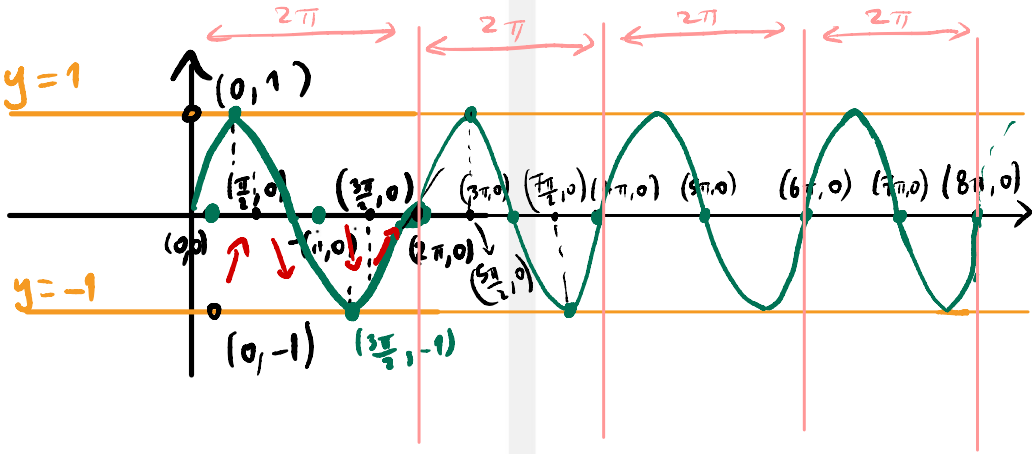
$\Delta = \left(\frac{7\pi}{2}, -1\right) \in \Gamma_{\sin x}$

$E = (4\pi, 0) \in \Gamma_{\sin x}$



Made with Goodnotes

Γράφημα $f(x) = \sin x$, $x \geq 0$



Made with Goodnotes