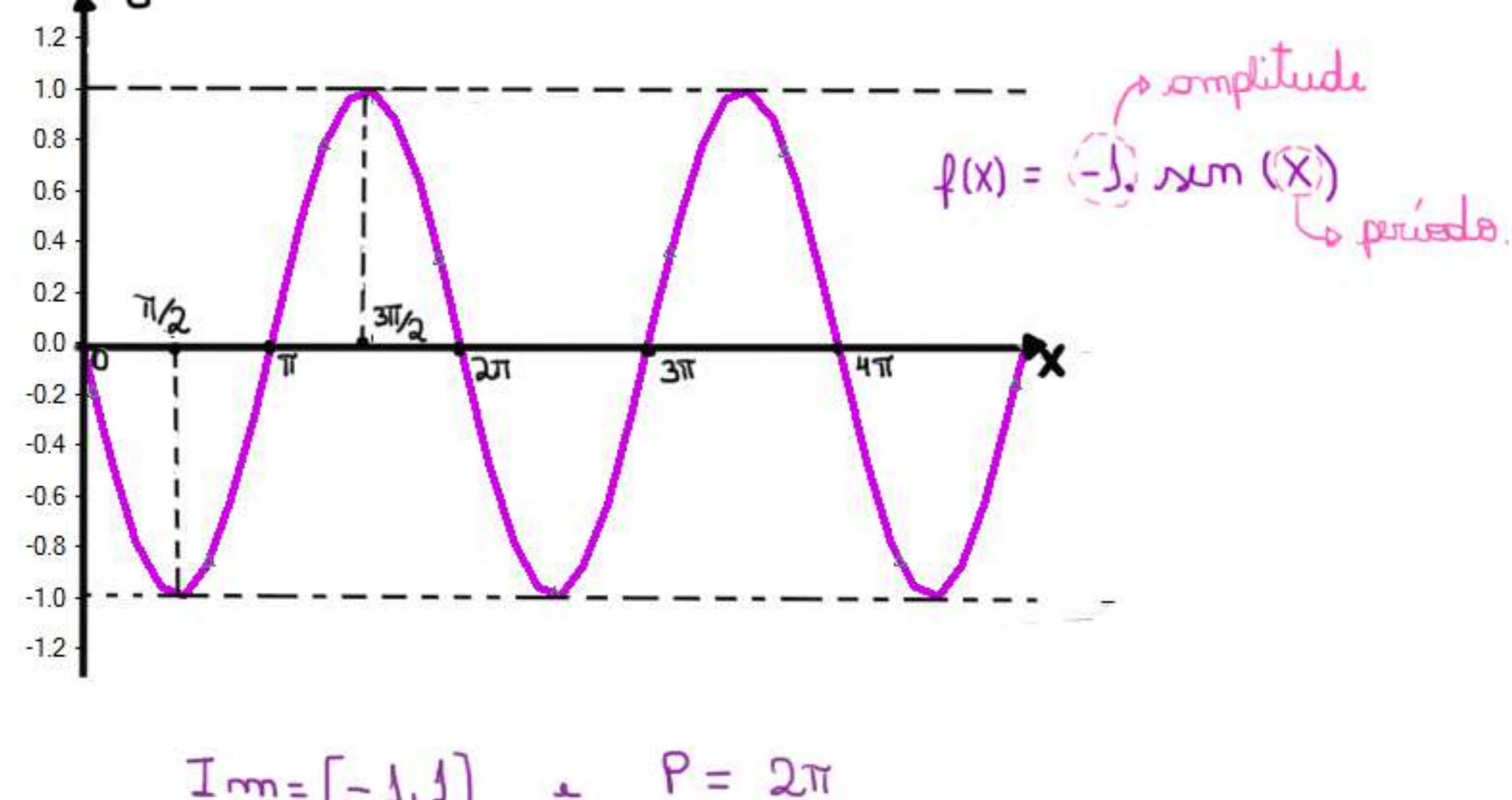


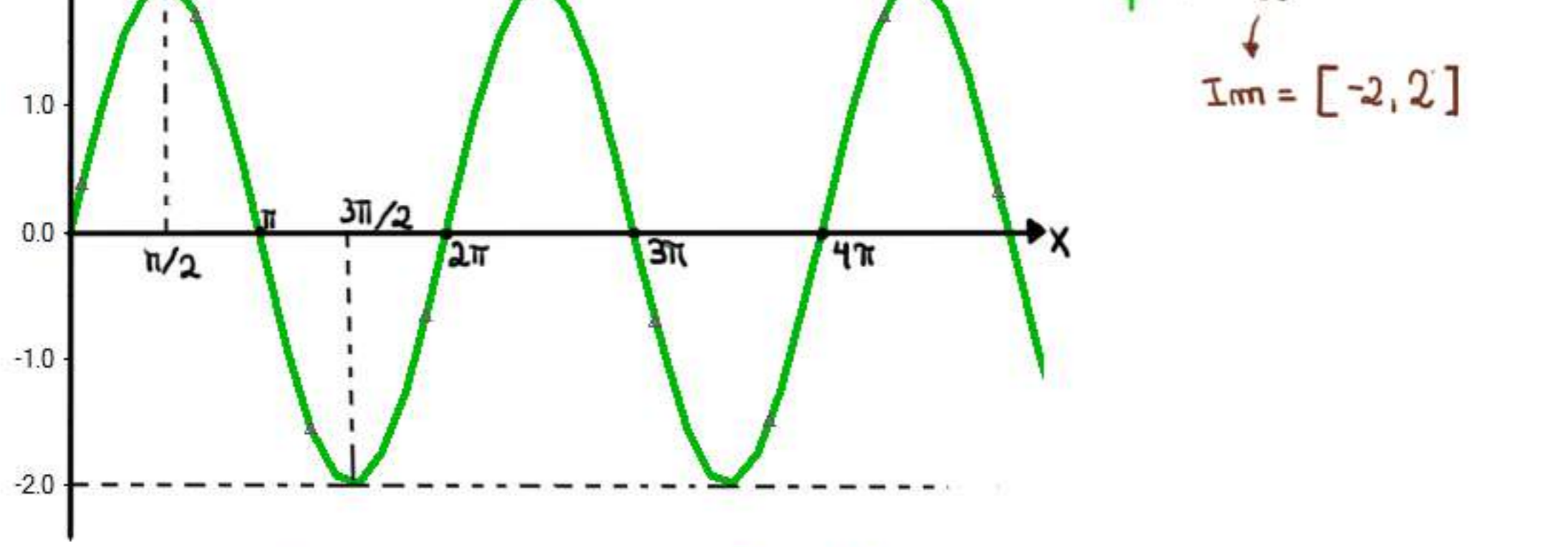
Determine o período e a imagem e faça o gráfico de um período completo das funções abaixo:

1. $f: \mathbb{R} \rightarrow \mathbb{R}$ dada por $f(x) = -\text{sen } x$.



$I_{\text{im}} = [-1, 1]$ e $P = 2\pi$

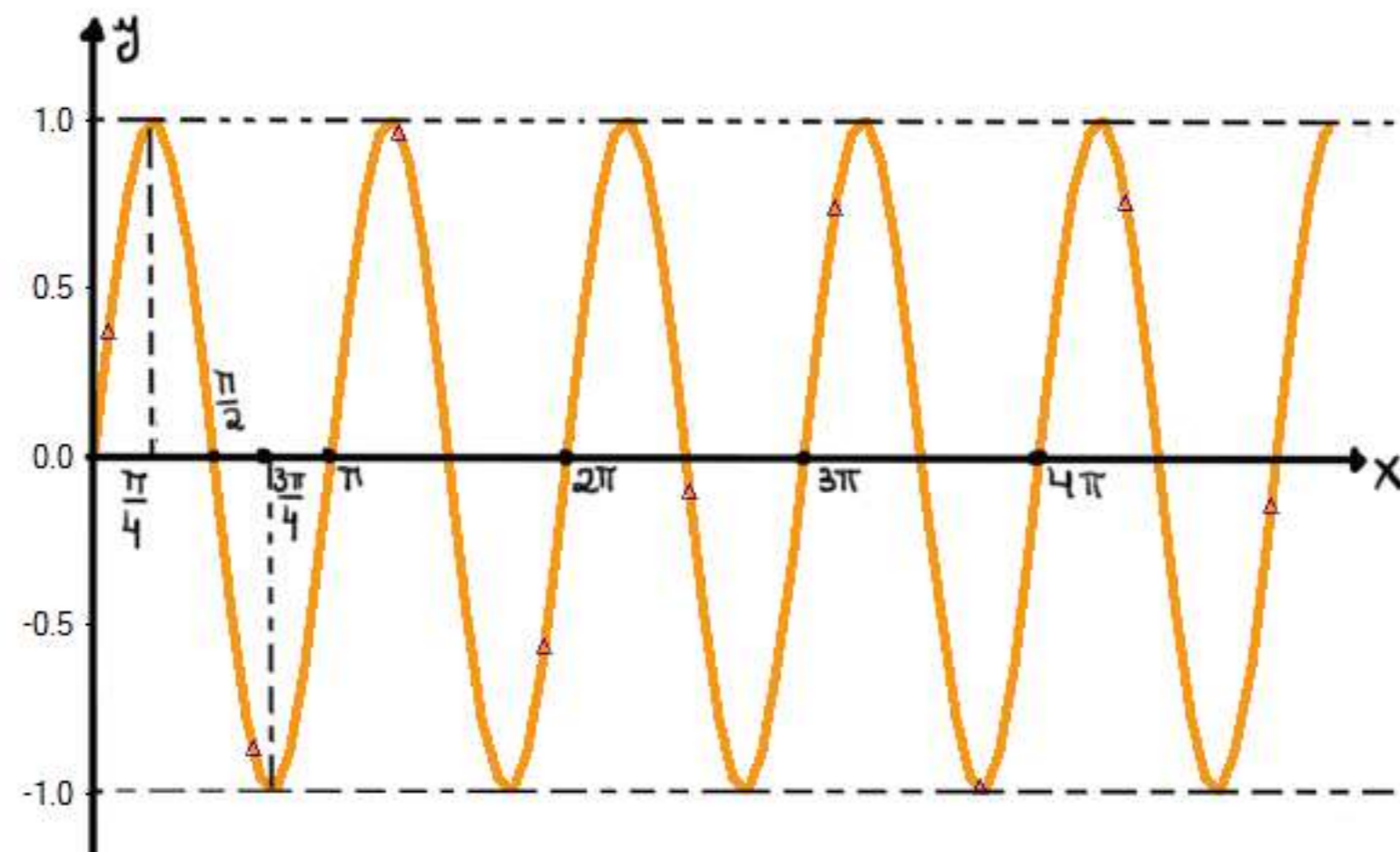
2. $f: \mathbb{R} \rightarrow \mathbb{R}$ dada por $f(x) = 2 \cdot \text{sen } x$.



$P = 2\pi$ e $I_{\text{im}} = [-2, 2]$

3. $f: \mathbb{R} \rightarrow \mathbb{R}$ dada por $f(x) = \text{sen } 2x$.

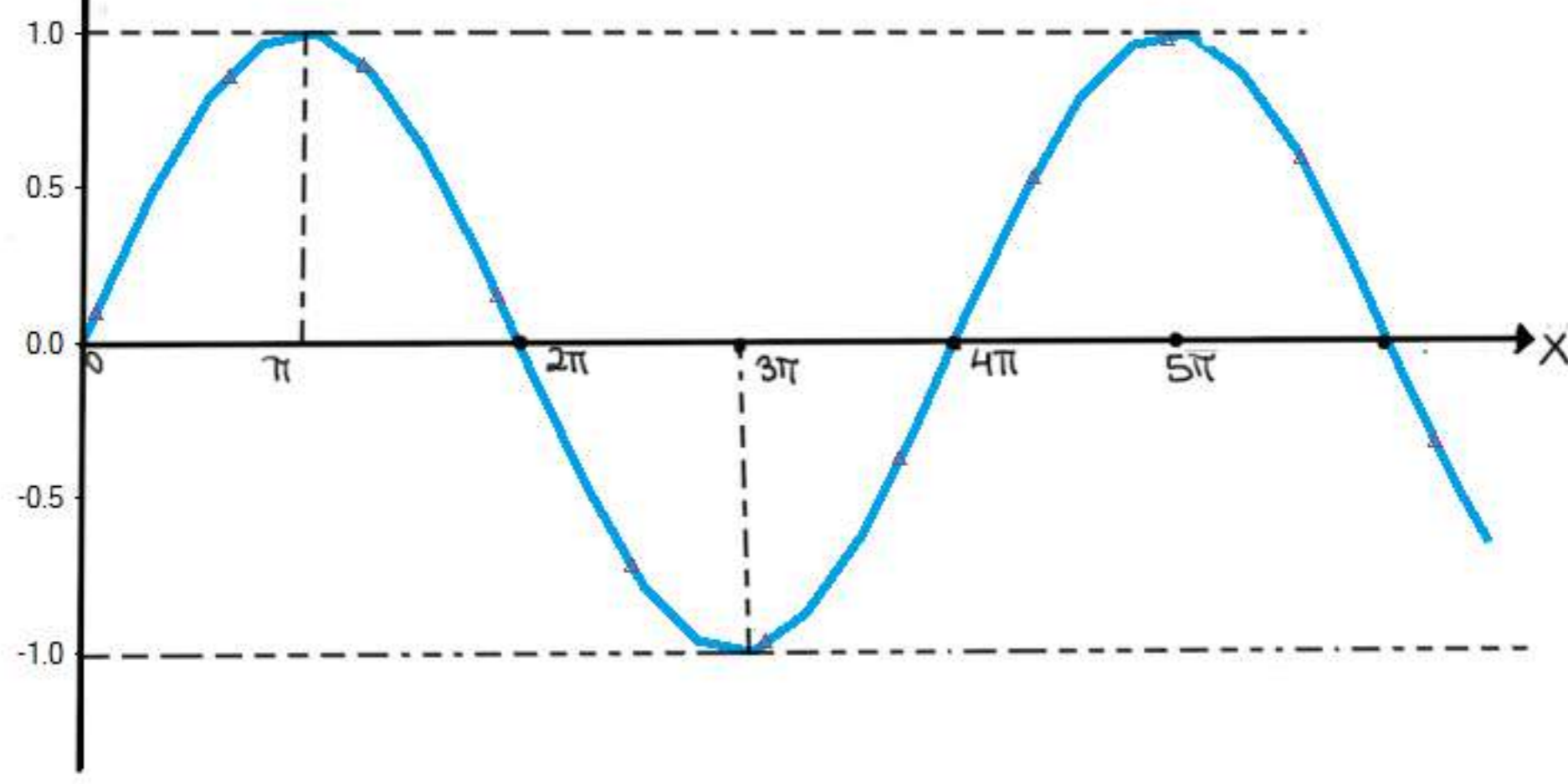
$f(x) = 1 \cdot \text{sen}(2x)$
 $\rightarrow \frac{2\pi}{2} = P = \pi$
 $\rightarrow \text{amplitude} : I_{\text{im}} = [-1, 1]$



$P = \pi$ e $I_{\text{im}} = [-1, 1]$

4. $f: \mathbb{R} \rightarrow \mathbb{R}$ dada por $f(x) = \text{sen} \frac{x}{2}$.

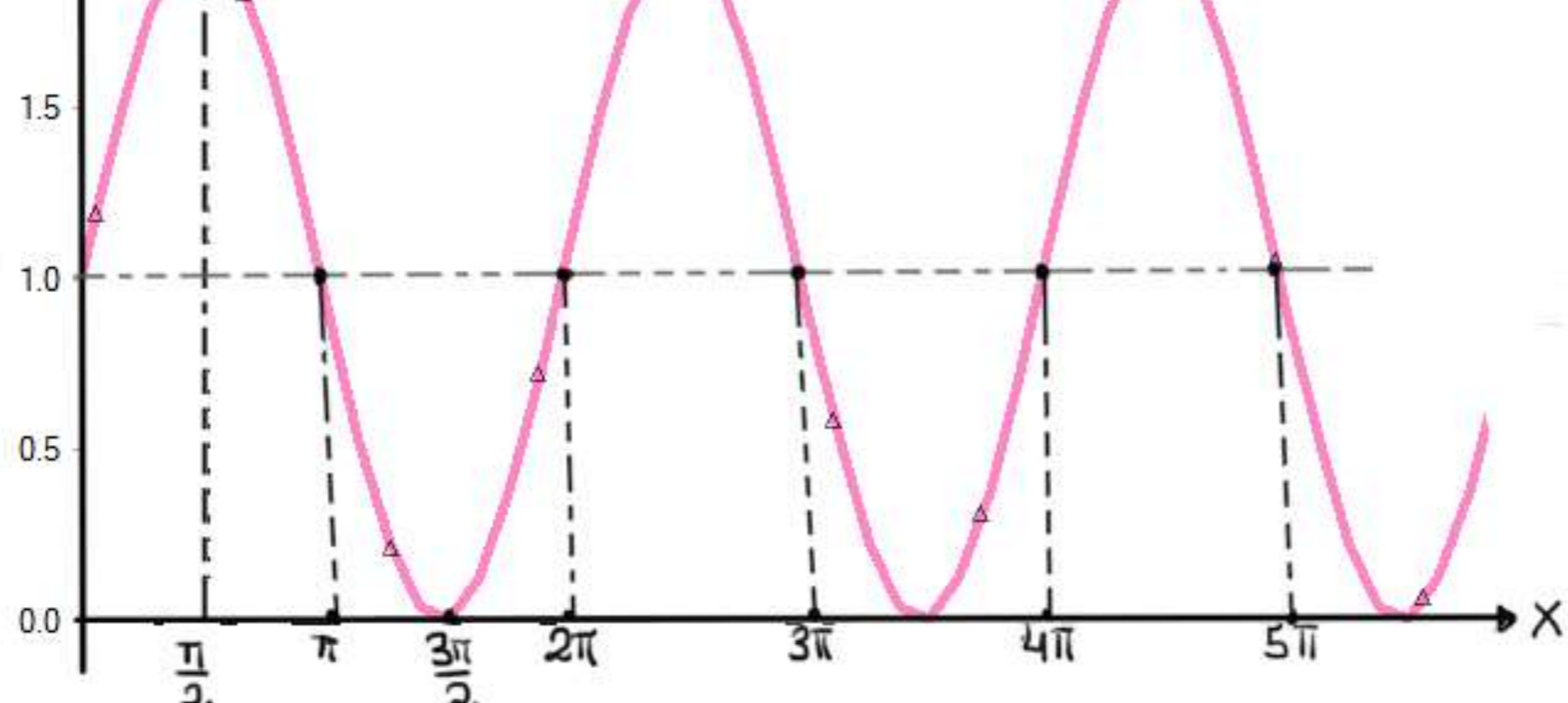
$f(x) = 1 \cdot \text{sen} \frac{x}{2} \rightarrow P = \frac{2\pi}{1/2} = 4\pi$
 $\rightarrow I_{\text{im}} = [-1, 1]$



$P = 4\pi$ e $I_{\text{im}} = [-1, 1]$

5. $f: \mathbb{R} \rightarrow \mathbb{R}$ dada por $f(x) = 1 + \text{sen } x$.

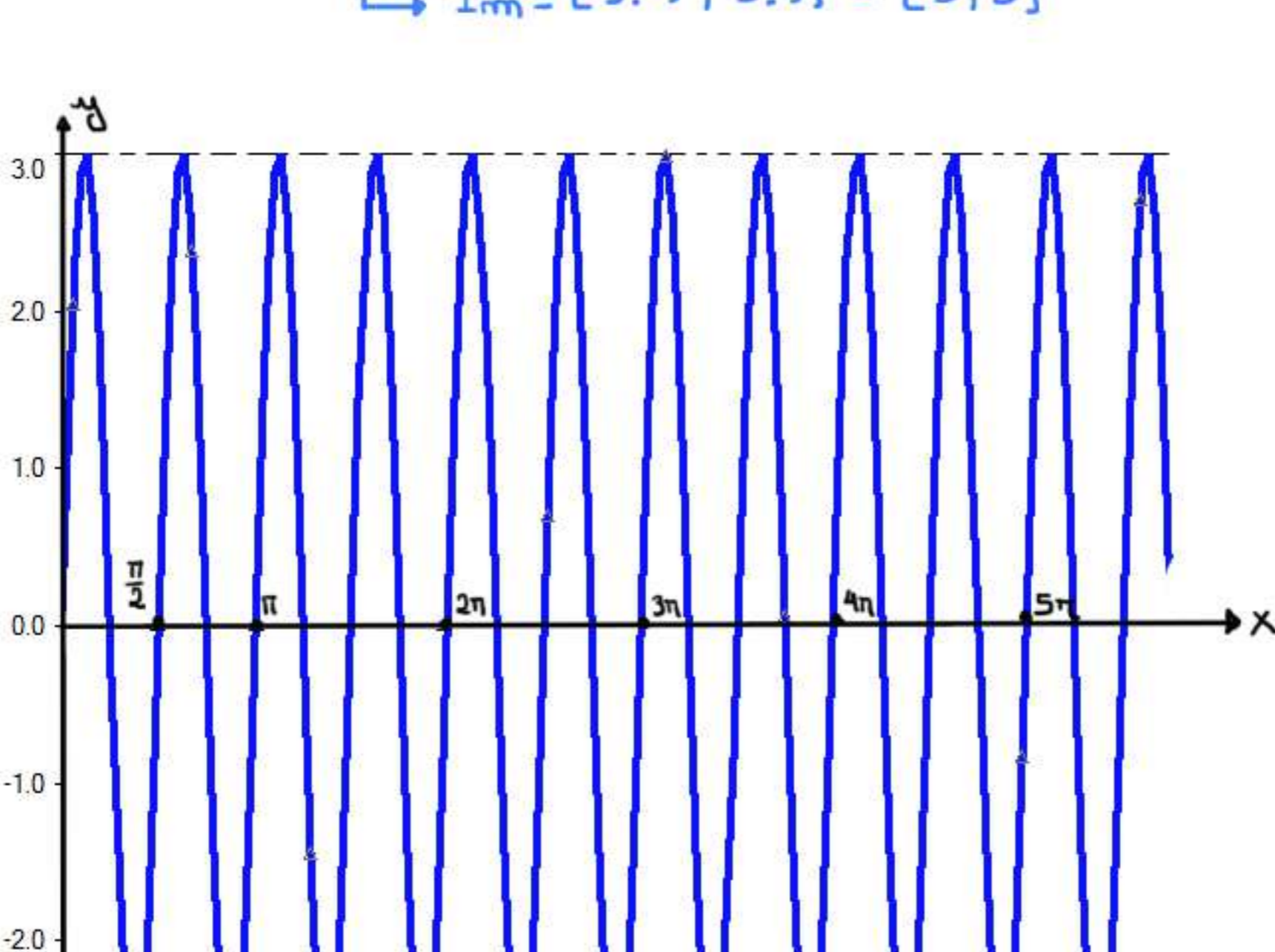
$f(x) = 1 + 1 \cdot \text{sen } x \rightarrow \frac{2\pi}{1} = P = 2\pi$
 $\rightarrow I_{\text{im}} = [-1+1, 1+1] = [0, 2]$



$P = 2\pi$ e $I_{\text{im}} = [0, 2]$

6. $f: \mathbb{R} \rightarrow \mathbb{R}$ dada por $f(x) = 3 \cdot \text{sen } 4x$.

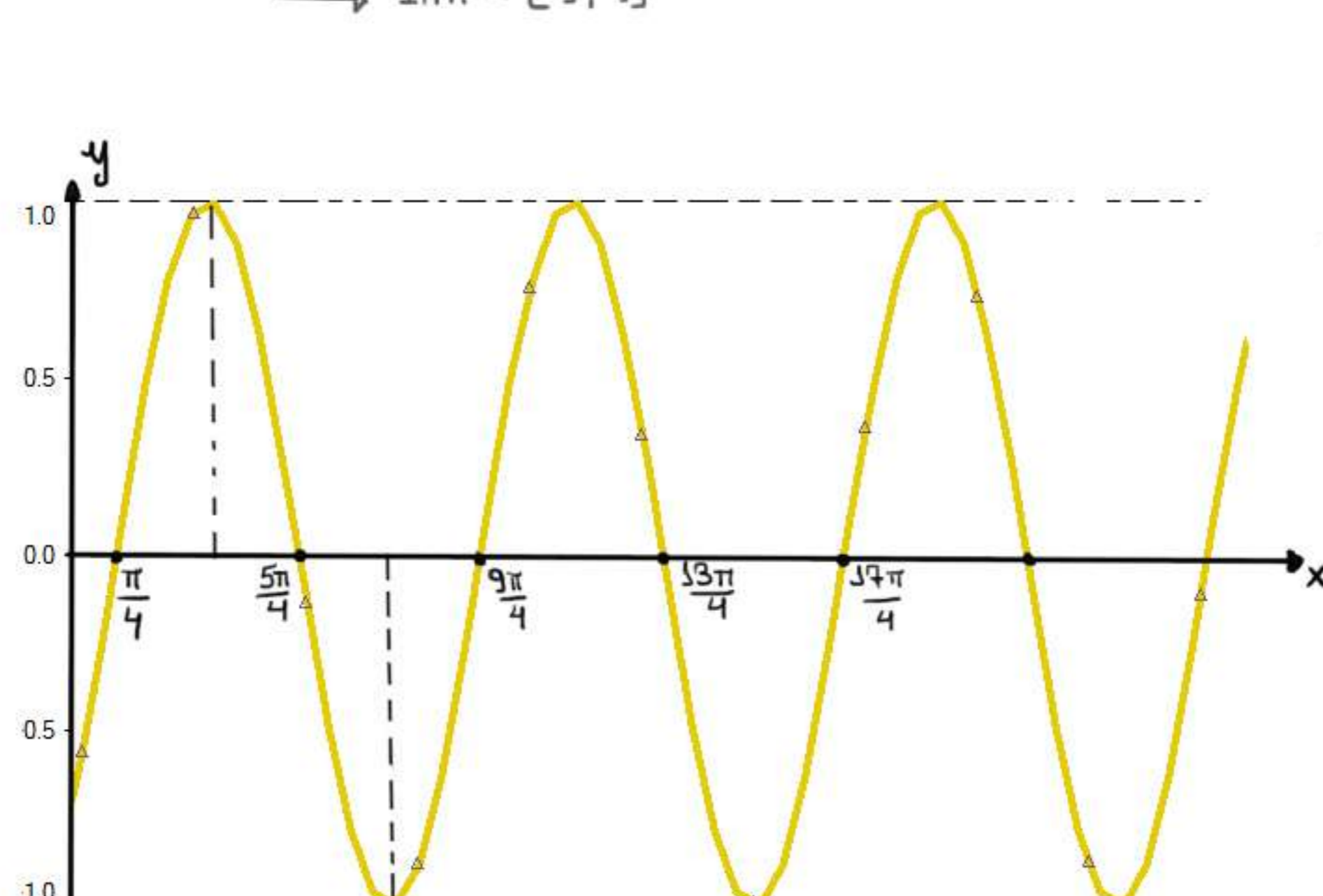
$f(x) = 3 \cdot \text{sen}(4x) \rightarrow P = \frac{2\pi}{4} = \frac{\pi}{2}$
 $\rightarrow I_{\text{im}} = [3 \cdot -1, 3 \cdot 1] = [-3, 3]$



$P = \frac{\pi}{2}$ e $I_{\text{im}} = [-3, 3]$

7. $f: \mathbb{R} \rightarrow \mathbb{R}$ dada por $f(x) = \text{sen} \left(x - \frac{\pi}{4} \right)$.

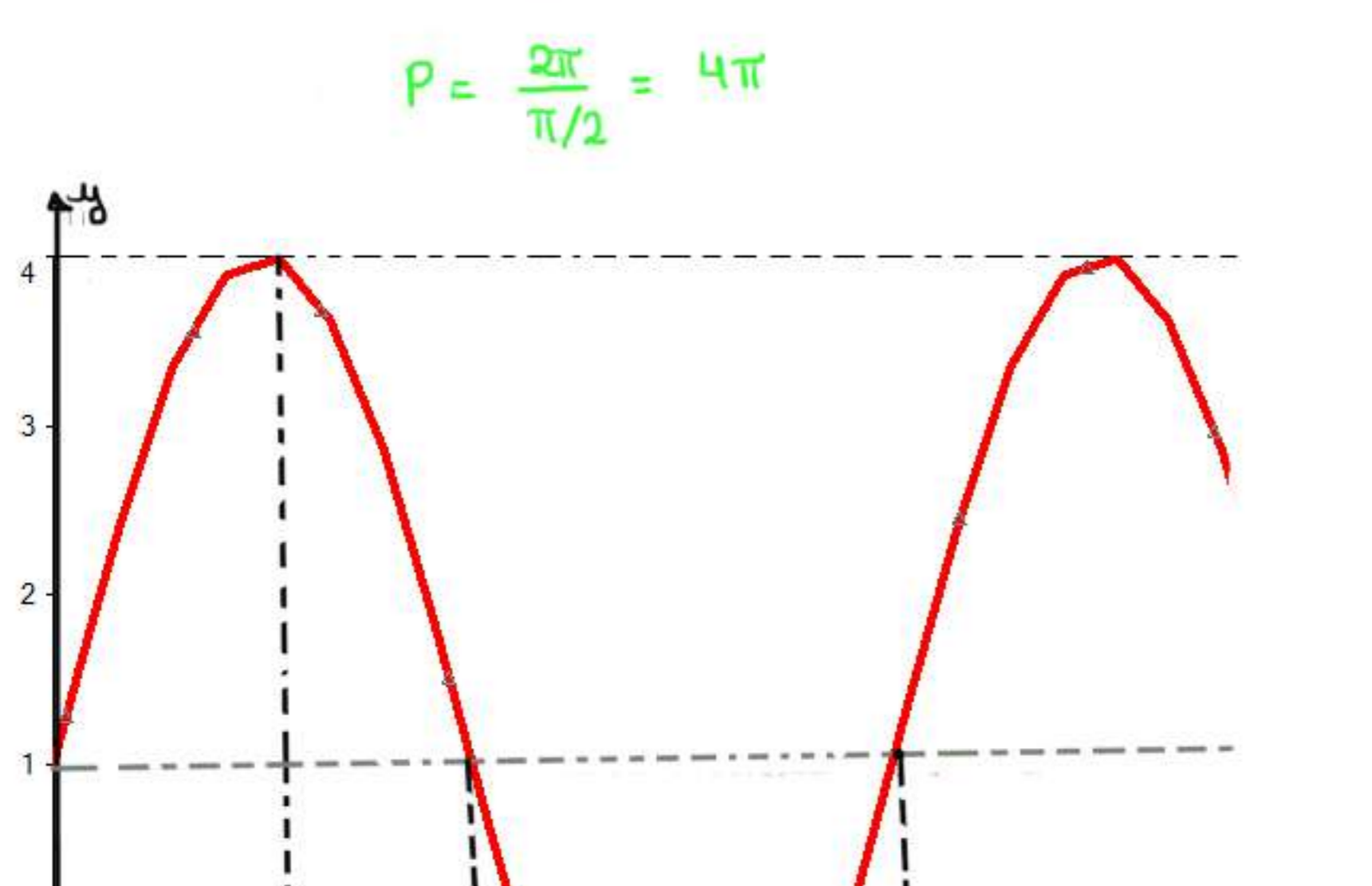
$f(x) = \text{sen} \left(x - \frac{\pi}{4} \right)$
 $\rightarrow P = \frac{2\pi}{1} = 2\pi$ com desloc de $\frac{\pi}{4}$
 $\rightarrow I_{\text{im}} = [-1, 1]$



$P = 2\pi$ e $I_{\text{im}} = [-1, 1]$

8. $f: \mathbb{R} \rightarrow \mathbb{R}$ dada por $f(x) = 1 + 3 \cdot \text{sen} \frac{x}{2}$.

$f(x) = 1 + 3 \cdot \text{sen} \frac{x}{2}$
 $I_{\text{im}} = [1-3, 1+3] = [-2, 4]$
 $P = \frac{2\pi}{1/2} = 4\pi$



$P = 4\pi$ e $I_{\text{im}} = [-2, 4]$