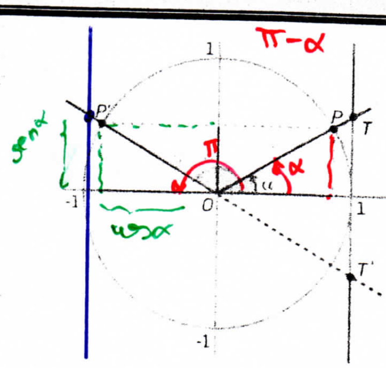
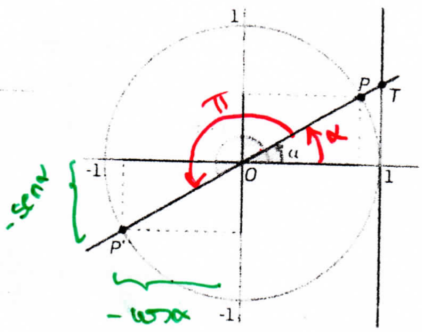
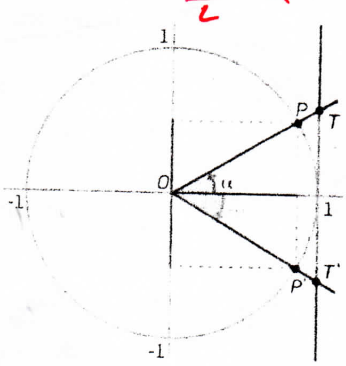
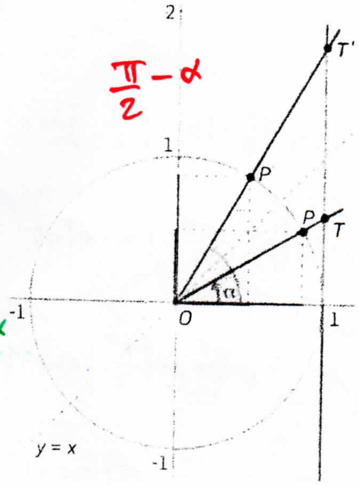
Sistema circular	Sistema sexagesimal
$\pi - \alpha$	
$\cos(\pi - \alpha) = -\cos\alpha$	$\cos(180^\circ - \alpha) = -\cos\alpha$
$\text{sen}(\pi - \alpha) = \text{sen}\,\alpha$	$\text{sen}(180^\circ - \alpha) = \text{sen}\,\alpha$
$\text{tg}(\pi - \alpha) = -\text{tg}\,\alpha = \frac{\text{sen}\,\alpha}{-\cos\alpha} = -\frac{\text{sen}\,\alpha}{\cos\alpha}$	$\text{tg}(180^\circ - \alpha) = -\text{tg}\,\alpha$
$\pi + \alpha$	
$\cos(\pi + \alpha) = -\cos\alpha$	$\cos(180^\circ + \alpha) = -\cos\alpha$
$\text{sen}(\pi + \alpha) = -\text{sen}\,\alpha$	$\text{sen}(180^\circ + \alpha) = -\text{sen}\,\alpha$
$\text{tg}(\pi + \alpha) = \text{tg}\,\alpha$	$\text{tg}(180^\circ + \alpha) = \text{tg}\,\alpha$
$\cos(-\alpha) = \cos\alpha$	$\cos(-\alpha) = \cos\alpha$
$\text{sen}(-\alpha) = -\text{sen}\,\alpha$	$\text{sen}(-\alpha) = -\text{sen}\,\alpha$
$\text{tg}(-\alpha) = -\text{tg}\,\alpha$	$\text{tg}(-\alpha) = -\text{tg}\,\alpha$
$\frac{\pi}{2} - \alpha$	
$\cos\left(\frac{\pi}{2} - \alpha\right) = \text{sen}\,\alpha$	$\cos(90^\circ - \alpha) = \text{sen}\,\alpha$
$\text{sen}\left(\frac{\pi}{2} - \alpha\right) = \cos\alpha$	$\text{sen}(90^\circ - \alpha) = \cos\alpha$
$\text{tg}\left(\frac{\pi}{2} - \alpha\right) = \frac{1}{\text{tg}\,\alpha} = \frac{\cos\alpha}{\text{sen}\,\alpha}$	$\text{tg}(90^\circ - \alpha) = \frac{1}{\text{tg}\,\alpha}$
$\frac{\pi}{2} + \alpha$	
$\cos\left(\frac{\pi}{2} + \alpha\right) = -\text{sen}\,\alpha$	$\cos(90^\circ + \alpha) = -\text{sen}\,\alpha$
$\text{sen}\left(\frac{\pi}{2} + \alpha\right) = \cos\alpha$	$\text{sen}(90^\circ + \alpha) = \cos\alpha$
$\text{tg}\left(\frac{\pi}{2} + \alpha\right) = -\frac{1}{\text{tg}\,\alpha}$	$\text{tg}(90^\circ + \alpha) = -\frac{1}{\text{tg}\,\alpha}$









$$\text{sen}\left(\frac{3\pi}{2} - \alpha\right) = -\cos\alpha$$

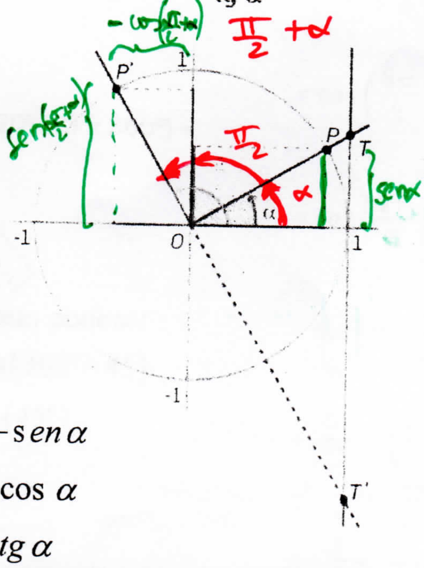
$$\cos\left(\frac{3\pi}{2} - \alpha\right) = -\text{sen}\,\alpha$$

$$\text{tg}\left(\frac{3\pi}{2} - \alpha\right) = \frac{1}{\text{tg}\,\alpha}$$

$$\text{sen}\left(\frac{3\pi}{2} + \alpha\right) = -\cos\alpha$$

$$\cos\left(\frac{3\pi}{2} + \alpha\right) = \text{sen}\,\alpha$$

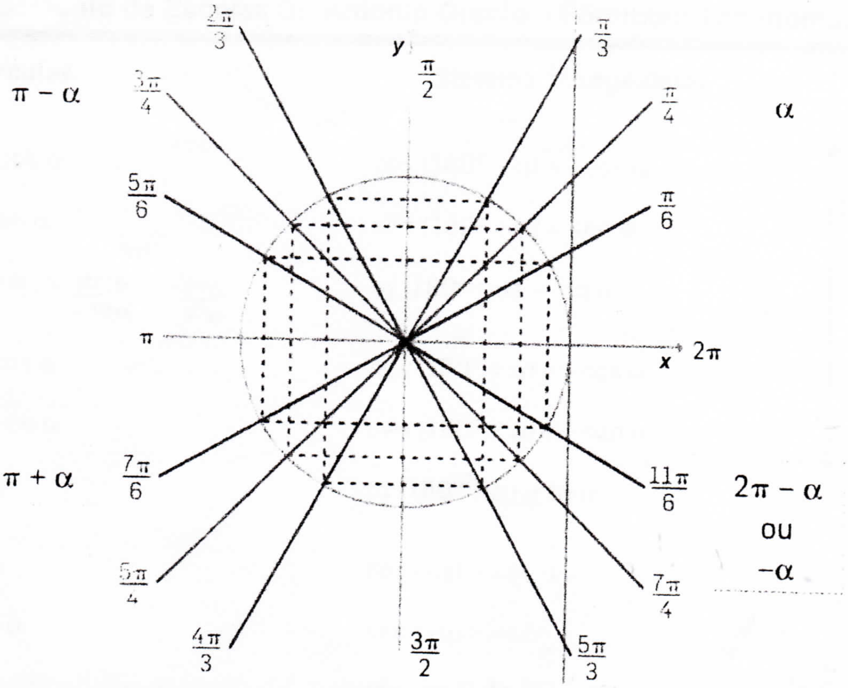
$$\text{tg}\left(\frac{3\pi}{2} + \alpha\right) = -\frac{1}{\text{tg}\,\alpha}$$



$$\text{sen}(2\pi - \alpha) = -\text{sen}\,\alpha$$

$$\cos(2\pi - \alpha) = \cos\alpha$$

$$\text{tg}(2\pi - \alpha) = -\text{tg}\,\alpha$$



Como determinar, sem recurso a calculadora, o valor de $\cos\left(\frac{16\pi}{3}\right)$? Vamos dar indicações gerais e aplicá-las a este caso particular.

1.º Se necessário, reduzir a amplitude do ângulo ao intervalo $[0, 2\pi[$, subtraindo ou adicionando múltiplos de 2π.

$$\cos\left(\frac{16\pi}{3}\right) = \cos\left(\frac{16\pi}{3} - 4\pi\right) = \cos\left(\frac{4\pi}{3}\right)$$

2.º Relacionar a amplitude obtida com uma amplitude α do 1.º quadrante, recorrendo às expressões: $\pi - \alpha$, $\pi + \alpha$ ou $-\alpha$.

$$\frac{4\pi}{3} = \pi + \frac{\pi}{3}$$

3.º Recorrendo ao círculo trigonométrico, aplicar as relações entre as razões trigonométricas de α e de $\pi - \alpha$, $\pi + \alpha$ ou $-\alpha$ e finalizar o cálculo.

$$\cos\left(\pi + \frac{\pi}{3}\right) = -\cos\left(\frac{\pi}{3}\right) = -\frac{1}{2}$$

Exemplos

a. $\text{sen}(150°) + \cos(315°) - \text{tg}(1320°) =$

$= \text{sen}(180° - 30°) \underbrace{+ \cos(315° - 360°)} - \text{tg}(1320° - 3 \times 360°) =$

$= \text{sen}(30°) + \cos(-45°) - \text{tg}(240°) =$

$= \text{sen}(30°) + \cos(45°) - \text{tg}(180° + 60°) =$

$= \frac{1}{2} + \frac{\sqrt{2}}{2} - \text{tg}(60°) =$

$= \frac{1}{2} + \frac{\sqrt{2}}{2} - \sqrt{3}$

também pode ser

$+\cos(360° - 45)$

$+\cos(45°)$

b. $\cos\left(\frac{8\pi}{3}\right) + \text{sen}\left(-\frac{9\pi}{4}\right) + \text{tg}\left(-\frac{\pi}{6}\right) =$

$= \cos\left(\frac{8\pi}{3} - 2\pi\right) + \text{sen}\left(-\frac{9\pi}{4} + 4\pi\right) - \text{tg}\left(\frac{\pi}{6}\right) =$

$= \cos\left(\frac{2\pi}{3}\right) + \text{sen}\left(\frac{7\pi}{4}\right) - \left(\frac{\sqrt{3}}{3}\right) =$

$= \cos\left(\pi - \frac{\pi}{3}\right) + \text{sen}\left(2\pi - \frac{\pi}{4}\right) - \frac{\sqrt{3}}{3} =$

$= -\cos\left(\frac{\pi}{3}\right) - \text{sen}\left(\frac{\pi}{4}\right) - \frac{\sqrt{3}}{3} =$

$= -\frac{1}{2} - \frac{\sqrt{2}}{2} - \frac{\sqrt{3}}{3}$