



TRIGONOMETRY

ADVISORY

4th
SECONDARY

TOMOS 5 y 6



 **SACO OLIVEROS**



1. Si $x \in [-4; 2]$, determine la suma del máximo y mínimo valor de:

$$S = \frac{5x + 2}{3}$$

RESOLUCIÓN

Del dato: $x \in [-4; 2] \Rightarrow -4 \leq x \leq 2$

$$-20 \leq 5x \leq 10$$

$$-18 \leq 5x + 2 \leq 12$$

$$S_{\min} \rightarrow -6 \leq \underbrace{\frac{5x + 2}{3}}_S \leq 4 \leftarrow S_{\max}$$

$\times (5)$

$+(2)$

$\div (3)$

Calculamos:

$$E = S_{\min} + S_{\max}$$

$$E = -6 + 4$$

$$\therefore \boxed{E = -2}$$

2. Si $\theta \in \text{IVC}$, determine el intervalo de n :

$$\cos \theta = \frac{3n + 5}{4}$$

RESOLUCIÓN:

Como $\theta \in \text{IVC}$:



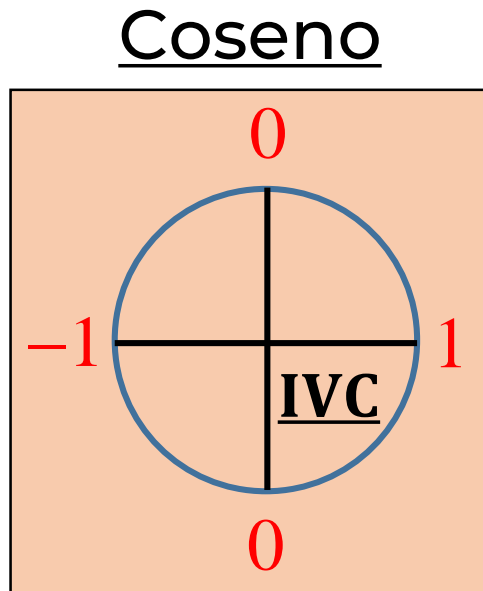
$$0 < \cos \theta < 1$$

$$0 < \frac{3n + 5}{4} < 1 \quad \times (4)$$

$$0 < 3n + 5 < 4 \quad -(5)$$

$$-5 < 3n < -1 \quad \div (3)$$

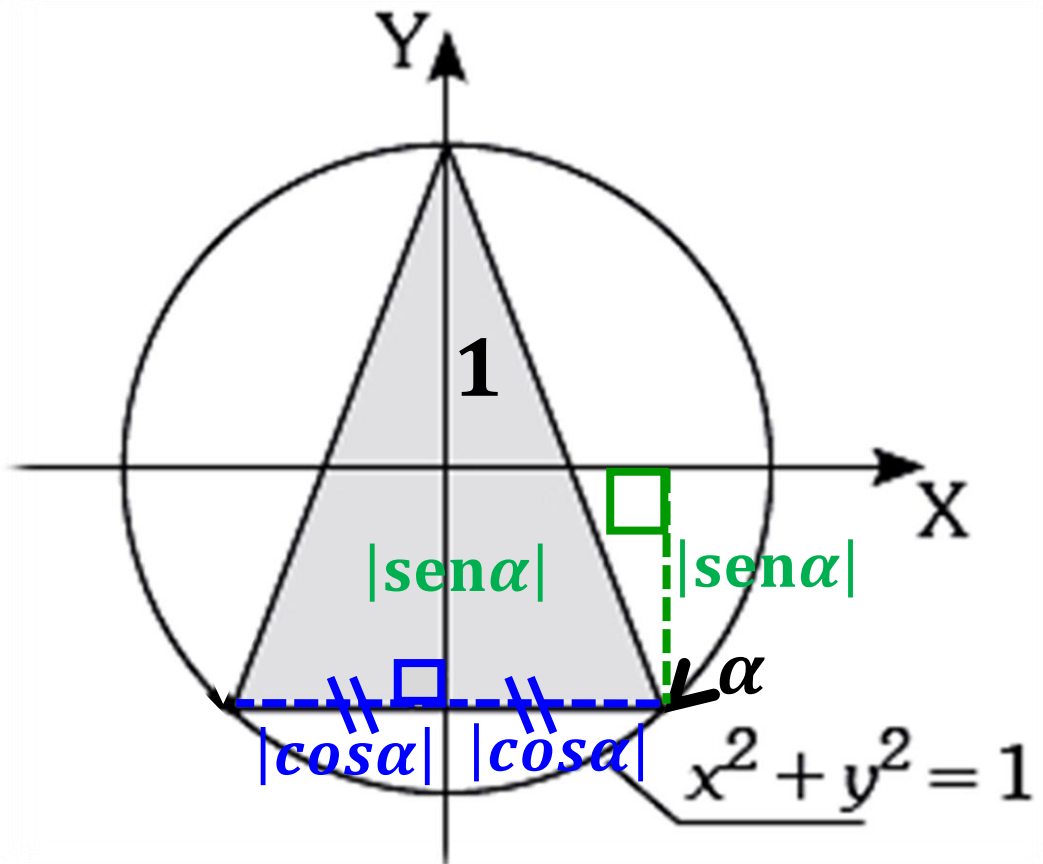
$$-\frac{5}{3} < n < -\frac{1}{3}$$



$$\therefore n \in \left\langle -\frac{5}{3}; -\frac{1}{3} \right\rangle$$



3. Del gráfico, determine el área de la región sombreada.



RESOLUCIÓN

Recordar:



$$S = \frac{b \times h}{2}$$

$$S = \frac{(\cancel{2}|\cos \alpha|)(1 + |\sen \alpha|)}{\cancel{2}}$$

como: $\alpha \in IVC$

$$|\cos \alpha| = \cos \alpha$$

$$|\sen \alpha| = -\sen \alpha$$

$$S = (\cos \alpha)(1 - \sen \alpha)$$

$$\therefore S = \cos \alpha (1 - \sen \alpha) u^2$$



4. Si se cumple que $\sec x + \tan x = 3$. Calcule $\tan x$.

RESOLUCIÓN

Por dato:

$$\sec x + \tan x = 3 \quad \dots (i)$$

Si

$$\sec x + \tan x = a$$

entonces

$$\sec x - \tan x = \frac{1}{a}$$

$$\longrightarrow \sec x - \tan x = \frac{1}{3} \quad \dots (ii)$$

$$\cancel{\sec x} + \tan x = 3$$

$$\cancel{\sec x} - \tan x = \frac{1}{3}$$

(-)

$$2\tan x = 3 - \frac{1}{3}$$

$$\cancel{2}^1 \tan x = \cancel{\frac{8}{3}}^4$$

\therefore

$$\tan x = \frac{4}{3}$$



5. Reducir $W = \frac{(\cos\theta - \operatorname{sen}\theta)(\sec\theta + \csc\theta)}{\tan\theta - \cot\theta}$

RESOLUCIÓN

$$W = \frac{(\cos\theta - \operatorname{sen}\theta)(\sec\theta + \csc\theta)}{(\tan\theta - \cot\theta)}$$

$$W = \frac{(\cos\theta - \operatorname{sen}\theta) \left(\frac{1}{\cos\theta} + \frac{1}{\operatorname{sen}\theta} \right)}{\left(\frac{\operatorname{sen}\theta}{\cos\theta} - \frac{\cos\theta}{\operatorname{sen}\theta} \right)}$$

$$W = \frac{(\cos\theta - \operatorname{sen}\theta) \left(\frac{\operatorname{sen}\theta + \cos\theta}{\cancel{\operatorname{sen}\theta \cdot \cos\theta}} \right)}{\left(\frac{\operatorname{sen}^2\theta - \cos^2\theta}{\cancel{\operatorname{sen}\theta \cdot \cos\theta}} \right)}$$

$$W = \frac{(\cos\theta - \operatorname{sen}\theta)(\operatorname{sen}\theta + \cos\theta)}{(\operatorname{sen}^2\theta - \cos^2\theta)}$$

$$W = \frac{(\cos^2\theta - \operatorname{sen}^2\theta)}{(\operatorname{sen}^2\theta - \cos^2\theta)}$$

$$W = \frac{-\cancel{(\operatorname{sen}^2\theta - \cos^2\theta)}}{\cancel{(\operatorname{sen}^2\theta - \cos^2\theta)}} \therefore \boxed{W = -1}$$



6. Reducir $D = \frac{1}{\frac{\cos x}{1 + \sin x} + \tan x}$

RESOLUCIÓN

$$D = \frac{1}{\frac{\cos x}{1 + \sin x} + \tan x}$$

$$D = \frac{1}{\frac{1 - \sin x}{\cos x} + \frac{\sin x}{\cos x}}$$

$$\frac{\cos x}{1 + \sin x} = \frac{1 - \sin x}{\cos x}$$

$$\tan x = \frac{\sin x}{\cos x}$$

$$D = \frac{1}{\frac{1 - \cancel{\sin x} + \cancel{\sin x}}{\cos x}}$$

$$D = \frac{1}{\frac{1}{\cos x}}$$

$$\therefore \mathbf{D = \cos x}$$



7. Si se cumple $\tan x + \cot x = 4$. Calcule $E = \sin^6 x + \cos^6 x$.

RESOLUCIÓN

$$\tan x + \cot x = \sec x \cdot \csc x$$

$$\sin^6 x + \cos^6 x = 1 - 3\sin^2 x \cdot \cos^2 x$$

Del dato:

$$\tan x + \cot x = 4$$

$$\sec x \cdot \csc x = 4$$

$$\frac{1}{\cos x} \cdot \frac{1}{\sin x} = 4$$

$$\sin x \cdot \cos x = \frac{1}{4}$$

Calculamos:

$$E = \sin^6 x + \cos^6 x$$

$$E = 1 - 3 \sin^2 x \cdot \cos^2 x$$

$$E = 1 - 3 \left(\frac{1}{4} \right)^2$$

$$E = 1 - \frac{3}{16}$$

\therefore

$$E = \frac{13}{16}$$



8. Sabiendo que $\text{sen}(\alpha + x) = 8\text{sen}(\alpha - x)$. Calcule $N = \frac{\tan\alpha}{\tan x}$

RESOLUCIÓN

$$\text{sen}(\alpha \pm \beta) = \text{sen}\alpha \cdot \cos\beta \pm \cos\alpha \cdot \text{sen}\beta$$

Del dato: $\text{sen}(\alpha + x) = 8 \cdot \text{sen}(\alpha - x)$

$$\text{sen}\alpha \cdot \cos x + \cos\alpha \cdot \text{sen}x = 8 (\text{sen}\alpha \cdot \cos x - \cos\alpha \cdot \text{sen}x)$$

$$\text{sen}\alpha \cdot \cos x + \cos\alpha \cdot \text{sen}x = 8\text{sen}\alpha \cdot \cos x - 8\cos\alpha \cdot \text{sen}x$$

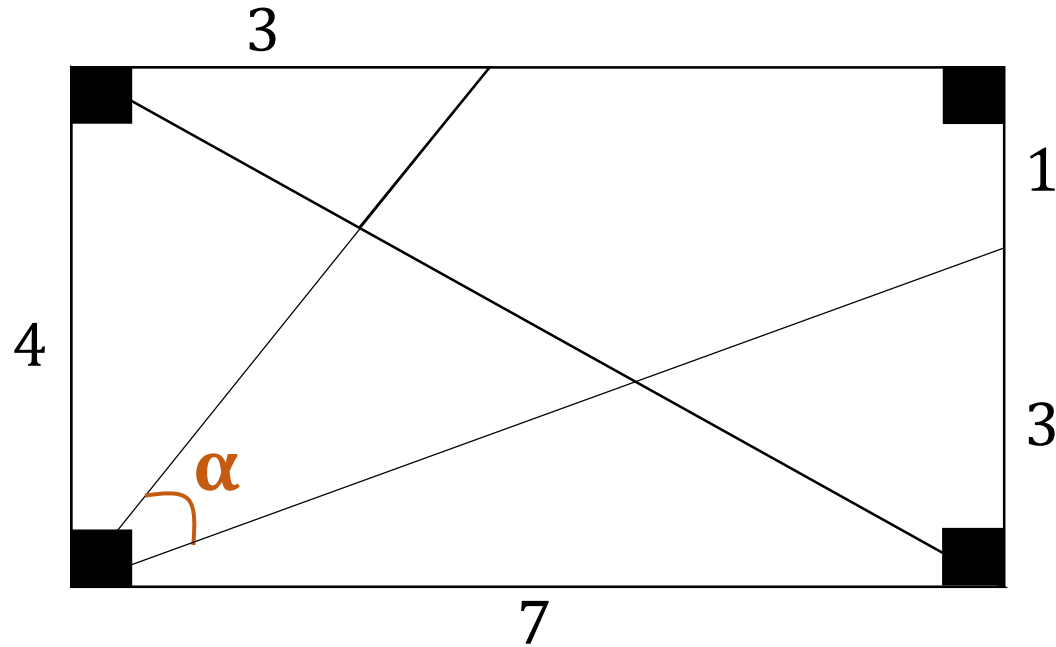
$$9\cos\alpha \cdot \text{sen}x = 7\text{sen}\alpha \cdot \cos x$$

$$9 \cdot \frac{\text{sen}x}{\cos x} = 7 \cdot \frac{\text{sen}\alpha}{\cos\alpha} \rightarrow \frac{9}{7} = \frac{\tan\alpha}{\tan x} \quad N$$

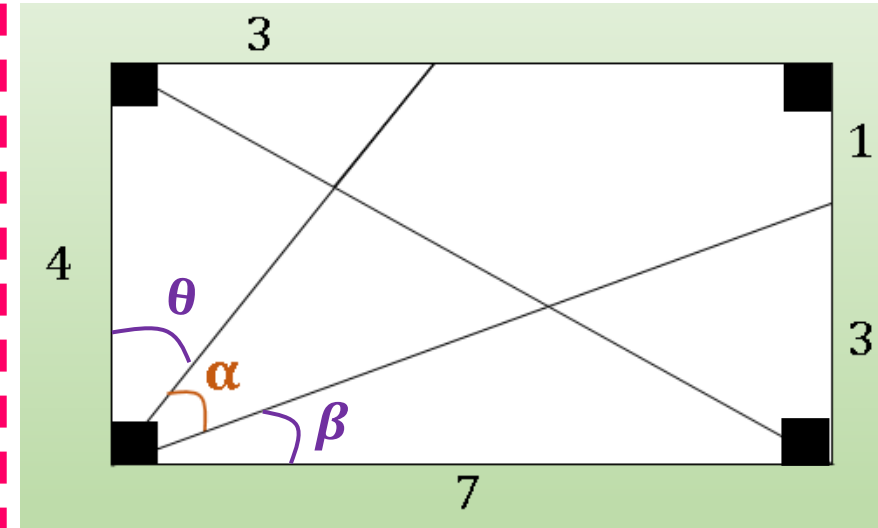
$$\therefore N = \frac{9}{7}$$



9. De la figura mostrada, calcule $\tan \alpha$.



Si $\theta + \alpha + \beta = 90^\circ$, entonces:
 $\tan \theta \cdot \tan \alpha + \tan \alpha \cdot \tan \beta + \tan \theta \cdot \tan \beta = 1$



$$\tan \theta = \frac{3}{4}$$

$$\tan \beta = \frac{3}{7}$$

Del gráfico: $\theta + \alpha + \beta = 90^\circ$

$$\frac{3}{4} \cdot \tan \alpha + \tan \alpha \cdot \frac{3}{7} + \frac{3}{7} \cdot \frac{3}{4} = 1 \quad \dots \times (28)$$

$$21 \cdot \tan \alpha + 12 \cdot \tan \alpha + 9 = 28$$

$$\Rightarrow 33 \tan \alpha = 19 \quad \therefore \tan \alpha = \frac{19}{33}$$



10. Si se cumple $\frac{\text{sen}^3 x + \cos^3 x}{\text{sen} x + \cos x} = \frac{7}{8}$. Calcule $N = \tan x + \cot x$

RESOLUCIÓN

Del dato: $\frac{\text{sen}^3 x + \cos^3 x}{\text{sen} x + \cos x} = \frac{7}{8}$

$$\frac{(\cancel{\text{sen} x + \cos x})(\text{sen}^2 x + \cos^2 x - \text{sen} x \cdot \cos x)}{(\cancel{\text{sen} x + \cos x})} = \frac{7}{8}$$

$$(\underbrace{\text{sen}^2 x + \cos^2 x}_{1} - \text{sen} x \cdot \cos x) = \frac{7}{8}$$

$$1 - \text{sen} x \cdot \cos x = \frac{7}{8}$$

$$a^3 + b^3 = (a + b)(a^2 + b^2 - ab)$$

$$\Rightarrow \text{sen} x \cdot \cos x = \frac{1}{8}$$

Calculamos:

$$N = \tan x + \cot x$$

$$N = \csc x \cdot \sec x$$

$$N = \frac{1}{\text{sen} x \cdot \cos x} = \frac{1}{\frac{1}{8}}$$

$$\therefore \boxed{N = 8}$$