



TRIGONOMETRY

Chapter 09

5th
SECONDARY

Reducción al primer
cuadrante II



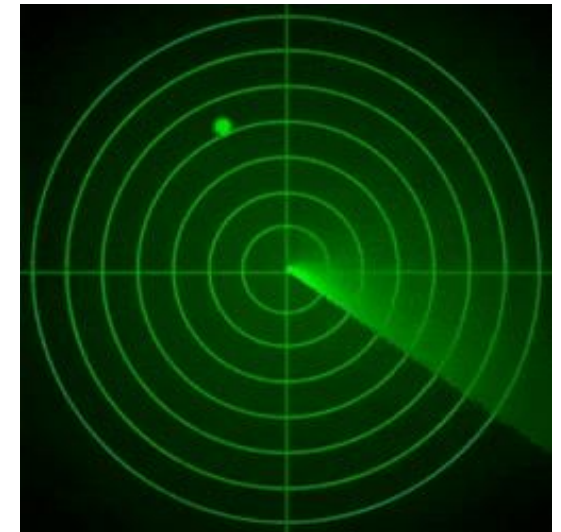
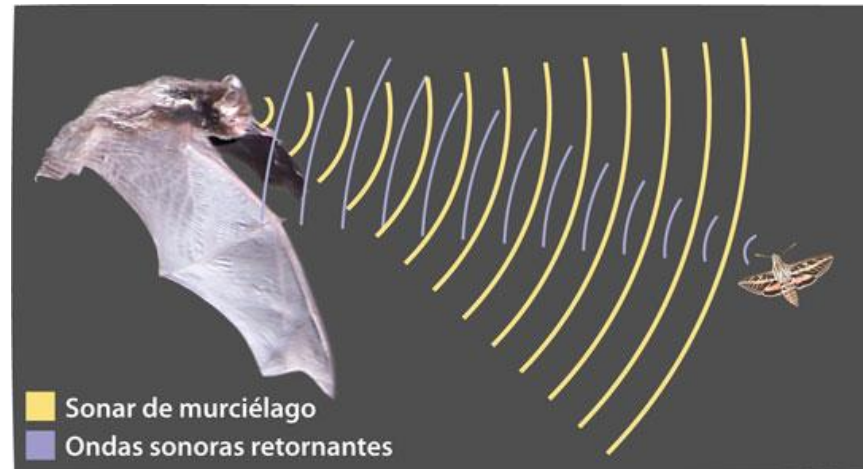
 **SACO OLIVEROS**



El **SISTEMA DE SONAR** es una técnica que usa la propagación del **sonido** bajo el agua (principalmente) para navegar, comunicarse o detectar objetos sumergidos.

El sonar funciona de forma similar al **radar**, con la diferencia de que en lugar de emitir **ondas electromagnéticas** emplea **impulsos sonoros**.

En la naturaleza, algunos animales como delfines y murciélagos usan el sonido para la detección de objetos





CASO III: Para ángulos positivos mayores a una vuelta

DE FORMA PRÁCTICA UTILIZAREMOS:

$$RT \left[\overbrace{360^\circ}^{2\pi} \cdot n \pm \alpha \right] = RT (\pm \alpha) ; \forall n \in \mathbb{Z}$$

Ejemplo:

$$\text{sen } 800^\circ = \text{sen}(\cancel{2 \times 360^\circ} + 80^\circ) = \text{sen } 80^\circ$$

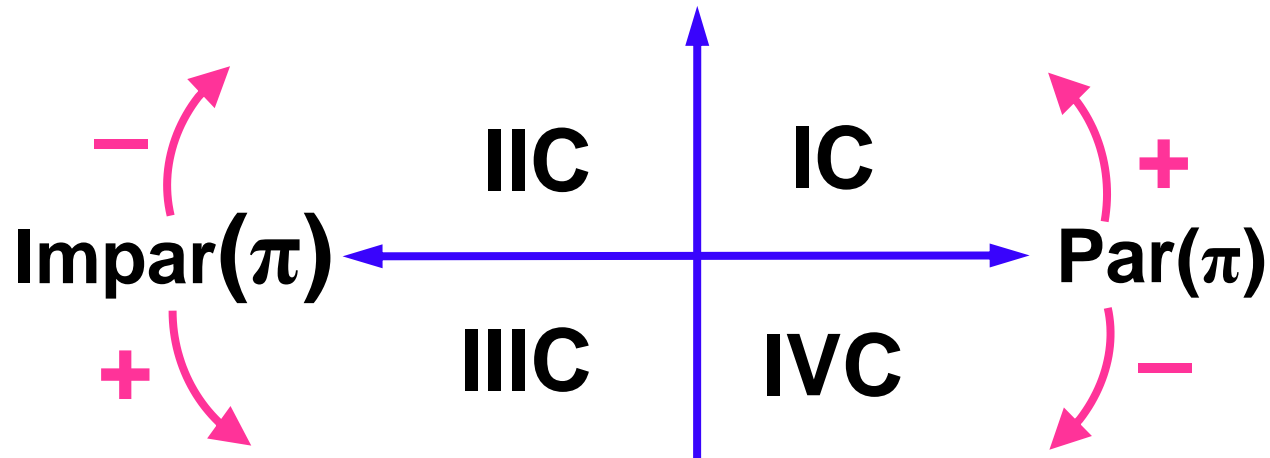
$$\begin{array}{r|l} 800^\circ & 360^\circ \\ 720^\circ & 2 \\ \hline 80^\circ & \end{array}$$





OBSERVACIONES

TENER EN CUENTA QUE

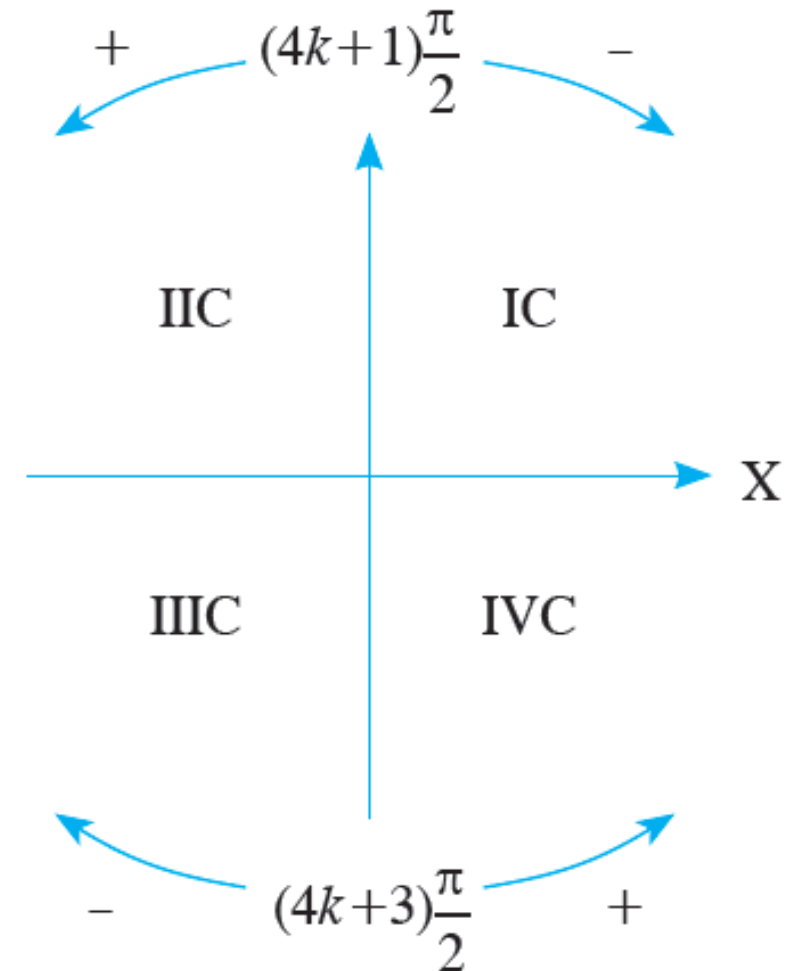


EJEMPLOS:

$$(4\pi + x) \in \text{IC} \quad (9\pi - x) \in \text{IIC}$$

$$\left(\frac{5\pi}{2} + x\right) \in \text{IIC} \quad \left(\frac{11\pi}{2} + x\right) \in \text{IVC}$$

TENER EN CUENTA QUE





1. Efectúe: = _____

RESOLUCIÓN

$$\begin{array}{r|l} 1500 & 360 \\ \hline 1440 & 4 \\ \hline 60 & \end{array}$$

$$\begin{array}{r|l} 1110 & 360 \\ \hline 1080 & 3 \\ \hline 30 & \end{array}$$

$$\begin{array}{r|l} 3645 & 360 \\ \hline 3600 & 10 \\ \hline 45 & \end{array}$$

Recordar: $RT(360^\circ k + x) = RT(x) ; k \in \mathbb{Z}$

$$P = \frac{\text{sen}60^\circ \cdot \text{cos}30^\circ}{\text{tan}45^\circ}$$

$$P = \frac{\left(\frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{3}}{2}\right)}{(1)}$$

$$\therefore P = \frac{3}{4}$$

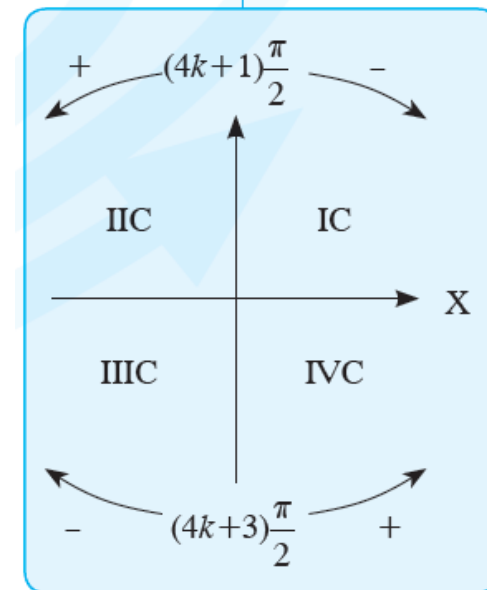
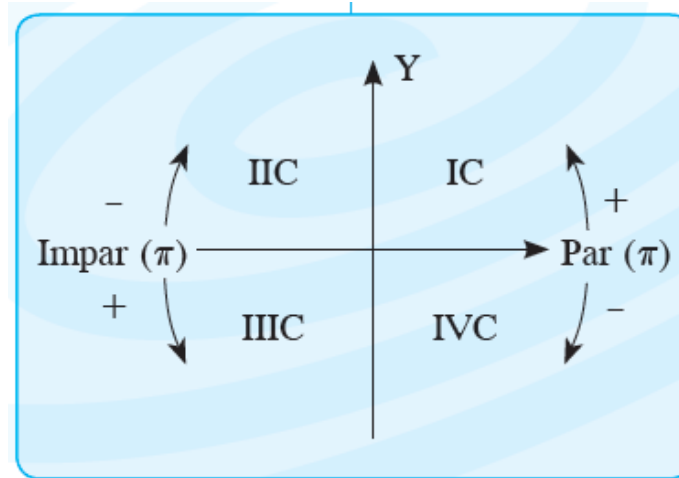


2. Simplifique la expresión:

$$= \frac{\pi + \quad \pi +}{\left(-\frac{\pi}{2} + \right)}$$

RESOLUCIÓN

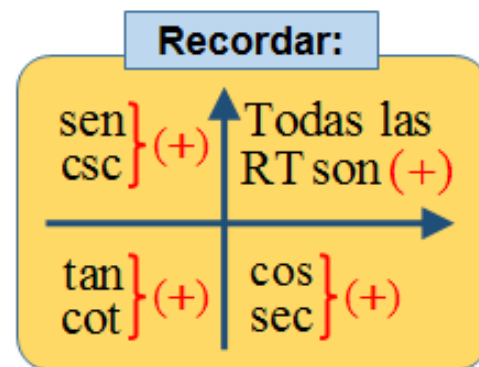
$$E = \frac{\overbrace{\text{sen}(8\pi + x)}^{\text{par}} \cdot \overbrace{\text{cos}(7\pi + x)}^{\text{impar}}}{\text{cos}\left(\underbrace{\frac{15\pi}{2} + x}_{4k+3}\right)}$$



$$E = \frac{\overbrace{\text{sen}(8\pi + x)}^{\text{IC}} \cdot \overbrace{\text{cos}(7\pi + x)}^{\text{IIC}}}{\text{cos}\left(\underbrace{\frac{15\pi}{2} + x}_{\text{IVC}}\right)}$$

$$E = \frac{\cancel{\text{sen}x} \cdot (-\text{cos}x)}{\cancel{\text{sen}x}}$$

$$\therefore E = -\text{cos}x$$



4. Halle el valor de "n" si se cumple que:

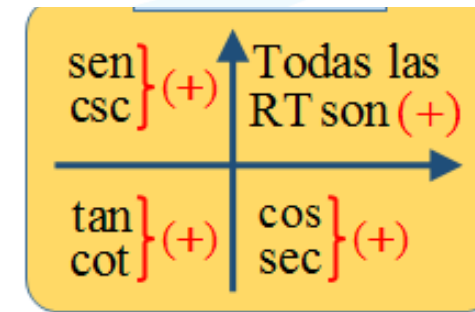
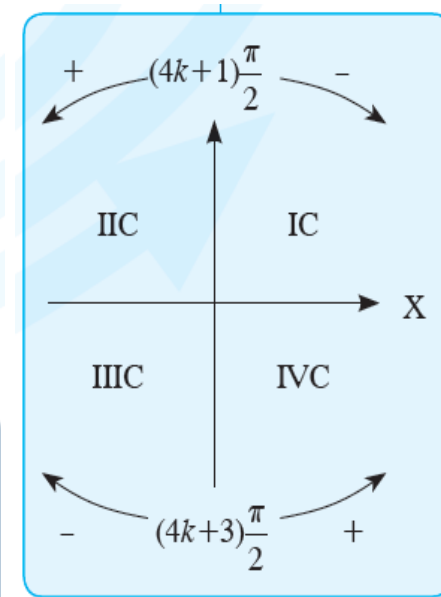
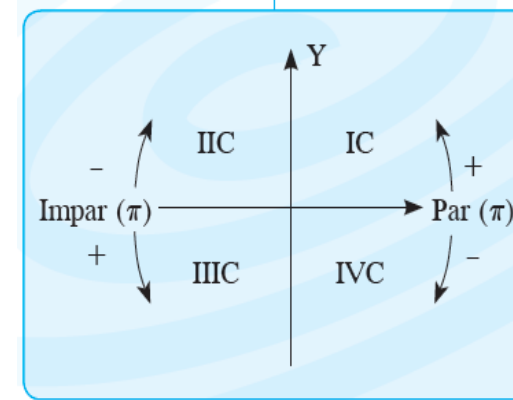
$$\left(\pi - \alpha \right) = \frac{-}{-} \quad \left(-\frac{\pi}{2} + \alpha \right) = \frac{-}{-}$$

RESOLUCIÓN

$$\text{sen}(\underbrace{21\pi}_{\text{IIC}} - \alpha) = \frac{n-1}{3} \Rightarrow \text{sen}\alpha = \frac{n-1}{3} \dots \text{(I)}$$

$$\cos(\underbrace{\frac{41\pi}{2}}_{\text{IIC}} + \alpha) = \frac{n}{2} - 3 \Rightarrow -\text{sen}\alpha = \frac{n}{2} - 3$$

$$\Rightarrow \text{sen}\alpha = 3 - \frac{n}{2} \dots \text{(II)}$$



Igualando (II) y (I):

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

$$\times 6 \quad 18 - 3n = 2n - 2$$

$$\Rightarrow 20 = 5n$$

$$\therefore n = 4$$



5. Halle el valor de: $= \left(-\frac{\pi}{3} \right) + \left(-\frac{\pi}{4} \right)$

RESOLUCIÓN

Dando forma a los ángulos

$$E = \cos\left(\frac{36\pi + \pi}{3}\right) + \tan\left(\frac{60\pi - \pi}{4}\right)$$

$$E = \cos\left(\frac{36\pi}{3} + \frac{\pi}{3}\right) + \tan\left(\frac{60\pi}{4} - \frac{\pi}{4}\right)$$

$$E = \cos\left(\underset{PAR}{12\pi} + \frac{\pi}{3}\right) + \tan\left(\underset{IMPAR}{15\pi} - \frac{\pi}{4}\right)$$

$$E = \cos\left(\overset{IC}{12\pi + \frac{\pi}{3}}\right) + \tan\left(\overset{IIC}{15\pi - \frac{\pi}{4}}\right)$$

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

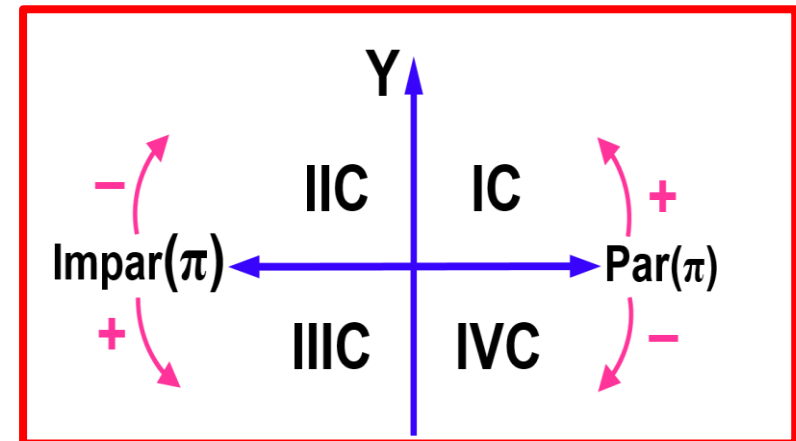
$$E = \cos 60^\circ - \tan 45^\circ$$

$$E = \frac{1}{2} - 1$$

$$\therefore E = \frac{1}{2}$$

Recordar:

sen } (+)	Todas las RT son (+)
csc } (+)	
tan } (+)	cos } (+)
cot } (+)	





6. Siendo $x + y = 1170^\circ$, reduzca: $\quad = \quad +$

RESOLUCIÓN

Del Dato: $y = 1170^\circ - x$

$$\Rightarrow G = \frac{\tan(1170^\circ - x)}{\cot x} + \text{sen}x \cdot \sec(1170^\circ - x)$$

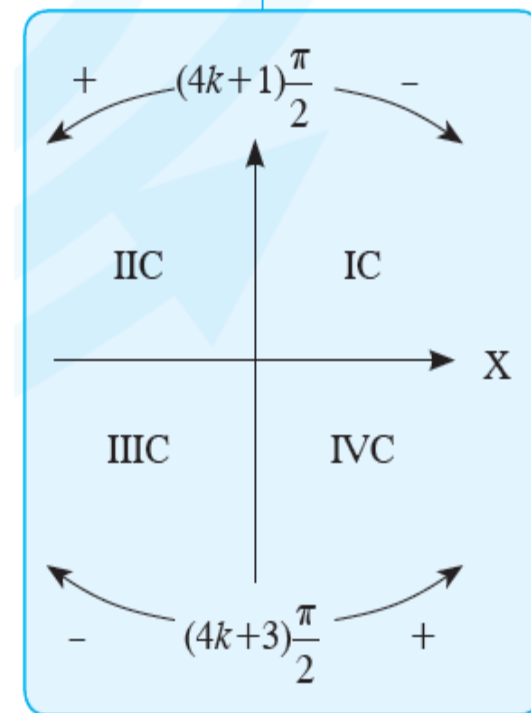
$$\Rightarrow G = \frac{\tan(13(90^\circ) - x)}{\cot x} + \text{sen}x \cdot \sec(13(90^\circ) - x)$$

$$\Rightarrow G = \frac{\tan(\overbrace{13(90^\circ) - x}^{\text{IC}})}{\cot x} + \text{sen}x \cdot \sec(\overbrace{13(90^\circ) - x}^{\text{IC}})$$

$$G = \frac{\cancel{\cot x}}{\cot x} + \underbrace{\text{sen}x \cdot \text{csc}x}_1$$

$$\Rightarrow G = 1 + 1$$

$$\therefore \boxed{G = 2}$$





7. Se cumple que $\tan(9\pi + x) = 2$. Efectúe:

$$= \left(-\frac{\pi}{2} - \right) \left(\pi + \right); \text{ si } x \text{ es un ángulo agudo.}$$

RESOLUCIÓN

Piden:

$$K = \cos \left(\overbrace{17\frac{\pi}{2} - x}^{\text{IC}} \right) \cdot \sec(24\pi + x) \quad \text{par}$$

$$K = \cos \left(\overbrace{17\frac{\pi}{2} - x}^{\text{IC}} \right) \cdot \underbrace{\sec(24\pi + x)}_{\sec x} \quad \text{IC}$$

$$K = \sin x \cdot \sec x \dots (*)$$

Del dato:

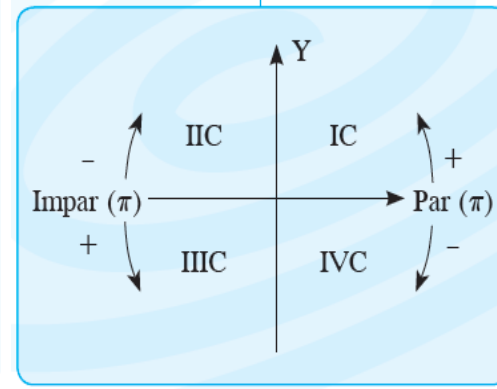
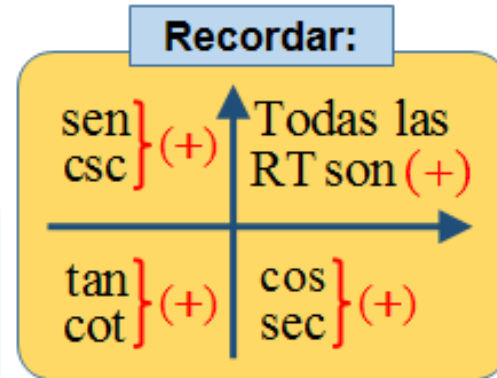
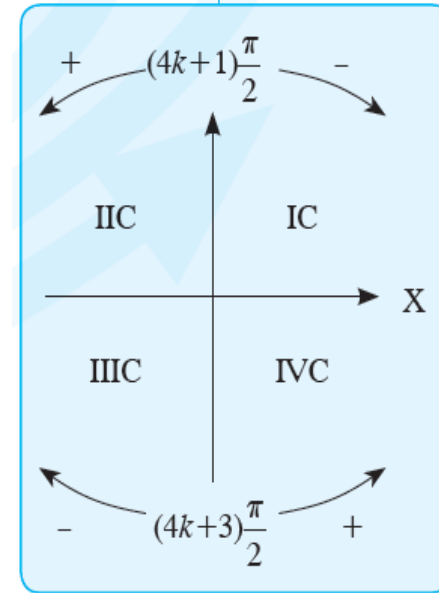
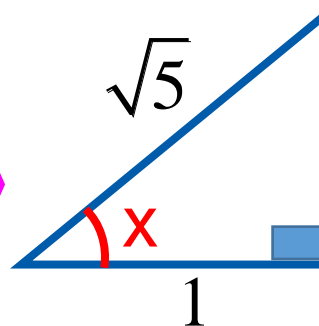
IMPAR

$$\tan(9\pi + x) = 2$$

$$\underbrace{\tan(9\pi + x)}_{\tan x} = 2$$

$$\tan x = 2$$

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



Reemplazando en (*):

$$K = \frac{2}{\sqrt{5}} \cdot \frac{\sqrt{5}}{1}$$

$$\therefore K = 2$$



8. Efectúe: $= \left(-\frac{\pi}{2} - \theta \right) \quad (\pi + \theta)$

Si: $\theta = \dots \quad \theta \in$

RESOLUCIÓN

Piden:

$$M = \csc \left(15 \frac{\pi}{2} - \theta \right) \cdot \cot(24\pi + \theta)$$

par

$$M = \underbrace{\csc \left(15 \frac{\pi}{2} - \theta \right)}_{\text{IIIC}} \cdot \underbrace{\cot(24\pi + \theta)}_{\text{IC}} = -\sec\theta \cdot \cot\theta$$

$$M = -\sec\theta \cdot \cot\theta$$

$$M = -\frac{r}{x} \cdot \frac{y}{r} \rightarrow M = -\frac{y}{x} \dots (*)$$

Del dato:

$$\sin\theta = -\frac{1}{2} = \frac{y}{r} \rightarrow \frac{r}{y} = -2$$

En ():* $M = -(-2) \quad \therefore \boxed{M = 2}$

Recordar:

sen csc	} (+)	Todas las RT son (+)	
tan cot			
		cos sec	} (+)

