$x = \lg b$ $\quad$ $b > 0$ $\quad$ $\cancel{\lg 0}$ $\quad$ $\cancel{\lg(-3)}$

$\Updownarrow$ per definizione

$e^x = b$ $\quad$ $\lg\left(\frac{1}{e^2}\right) = -2$

$\lg 1 = 0$ $\quad$ perché $e^0 = 1$

$\lg e = 1$ $\quad$ perché $e^1 = e$

$\lg e^2 = 2$ ...

dato che la base e è MAGGIORE di 1

$\boxed{b, c > 0}$

$x = \lg b \geq \lg c = y$ $\qquad$ $x \geq y$

$\Updownarrow$ $\qquad$ $\Updownarrow$

$b \geq c$ $\qquad$ $e^x = b \geq c = e^y$

Es

$$\log\left(\frac{2x}{x^2-1}\right) \geq 0 \qquad \frac{2x}{x^2-1} > 0$$

$\log A \geq r$ $\quad r \in \mathbb{R}$ $\quad$ A è una espressione nella x

$\leq$

prima di tutto studio per quali x $\boxed{A > 0}$

condizione di esistenza

Le soluzioni che otterrò alla fine dovranno essere intersecate con le sol. di $A > 0$.

$$\begin{cases} A > 0 \\ \lg(A) \geq r \end{cases}$$

$\lg(A) \overset{\leq}{\geq} r$

$\lg(A) \overset{\leq}{\geq} \lg(e^r)$

$\Downarrow$

$A \overset{\leq}{\geq} e^r > 0$

risolvo queste

$e^r > 0 \quad \forall r \in \mathbb{R}$

$r = \lg e^r$ VERA $\forall r \in \mathbb{R}$ (POSITIVO NEGATIVO o NULLO)

$\forall b > 0 \quad e^{\lg b} = b$

$$\boxed{\lg\left(\frac{2x}{x^2-1}\right)} \geq 0 .$$

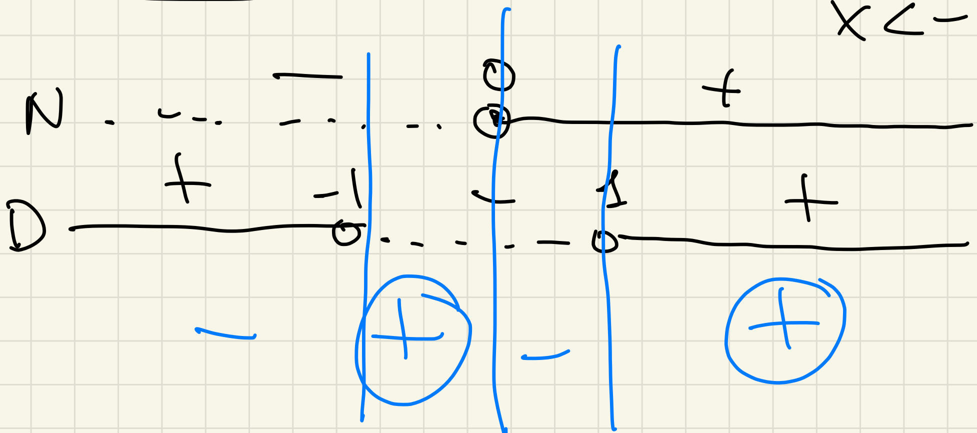
cond exist logaritmo

$$\frac{2x}{x^2-1} > 0$$

N. $2x > 0 \quad x > 0$

D. $x^2-1 > 0 \qquad x^2-1=0 \quad x_1 = 1, \; x_2 = -1$

$x < -1, \; x > 1$



$$\boxed{\begin{array}{c} -1 < x < 0 \\ x > 1 \end{array}}$$

$$0 = \log e^0 = \log 1 \qquad (r = \log e^r)$$

$$\log\left(\frac{2x}{x^2-1}\right) \geq \log 1 = 0$$

$$\frac{2x}{x^2-1} \geq 1 \qquad \frac{2x}{x^2-1} - 1 \geq 0$$

$$\frac{2x - 1(x^2-1)}{x^2-1} \geq 0 \qquad \boxed{\frac{2x - x^2 + 1}{x^2-1} \geq 0}$$

$$\frac{-x^2+2x+1}{x^2-1} \geq 0$$

$$\frac{-(x^2-2x-1)}{x^2-1} \geq 0$$

$$=$$

$$\boxed{\frac{x^2-2x-1}{x^2-1} \leq 0}$$

Δ Studio segno N e segno D

D $x^2-1>0 \Rightarrow x>1$, $x<-1$

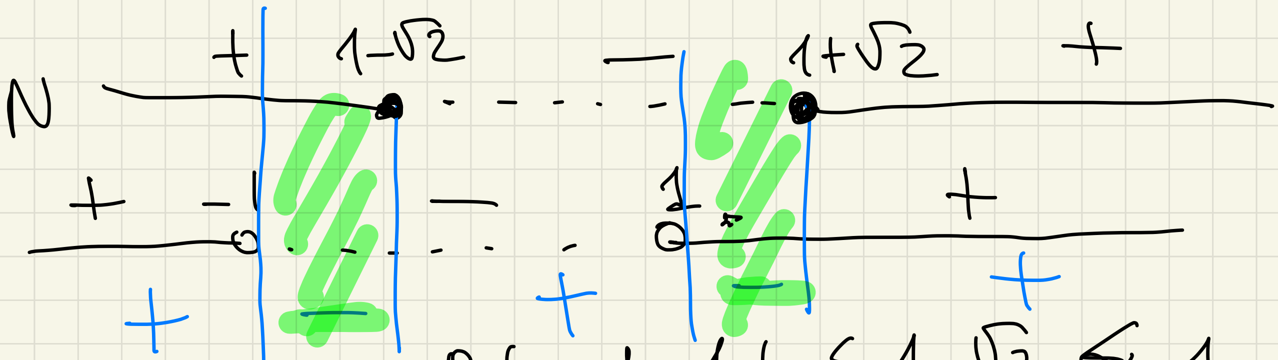
N $x^2-2x-1 \geq 0$

$x^2-2x-1=0$

$$x_{1,2} = \frac{2 \pm \sqrt{4+4}}{2} = \frac{2 \pm \sqrt{8}}{2} = \frac{2 \pm 2\sqrt{2}}{2} = \frac{\cancel{2}(1 \pm \sqrt{2})}{\cancel{2}}$$

$$\sqrt{8} = \sqrt{2^3} = \sqrt{2^2 \cdot 2} = \sqrt{2^2} \cdot \sqrt{2} = 2 \cdot \sqrt{2}$$

$N \geq 0 \qquad x \geq 1+\sqrt{2}$ oppure $x \leq 1-\sqrt{2}$

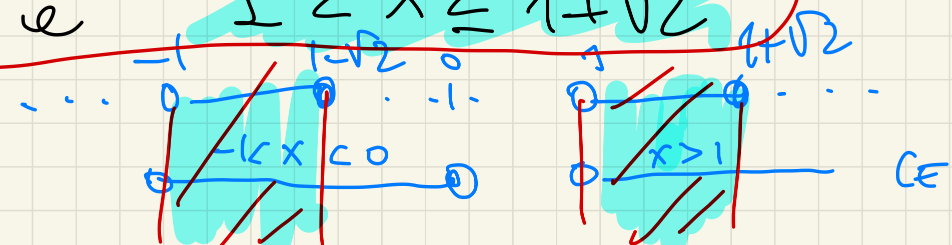


$-0{,}6 = 1-1{,}4 \leq 1-\sqrt{2} \leq 1-1{,}5 = -0{,}5$

$1{,}4 < \sqrt{2} < 1{,}5$

$-1 < x \leq 1-\sqrt{2}$ e $1 < x \leq 1+\sqrt{2}$

devo intersecare



ES $\quad (\lg x)^2 + 3\lg x + 2 \geq 0$

C. Esistenza
$x > 0$

$\lg A \geq \cancel{k}$

è diseq. di 2° grado nella variabile $\lg x$

$$\boxed{y = \lg x}$$

$$y^2 + 3y + 2 \geq 0$$

$y^2+3y+2 \geq 0$

$y^2+3y+2=0$

$$y_{12} = \frac{-3 \pm \sqrt{9-8}}{2} = \Big\langle$$

$$y_{12} = \Big\langle \begin{matrix} -1 \\ -2 \end{matrix}$$

$y \leq -2$ $\quad$ $y \geq -1$

① $\lg x \leq -2$ $\quad$ ② $\lg x \geq -1$

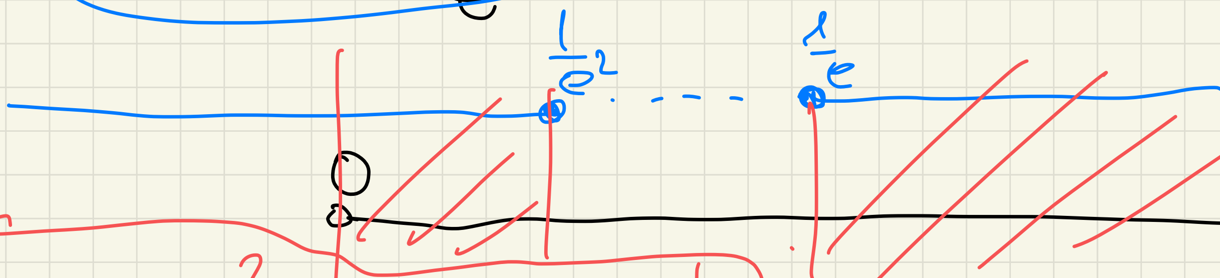
$$\log x \le -2 = \log e^{-2}$$

$$r = \log e^{r}$$

$$x \le e^{-2} = \frac{1}{e^2}$$

$$\log x \ge -1 = \log e^{-1}$$

$$x \ge e^{-1} = \frac{1}{e}$$



Cond esist logaritmo

$$0 < x \le e^{-2} \qquad x \ge e^{-1}$$

$$(\lg x)^2 + 3\lg x + 2 \le 0$$

$x > 0$

$y = \lg x$

$\downarrow$

$$y^2 + 3y + 2 \le 0$$

$\Downarrow$

$$-2 \le y \le -1$$

$\Downarrow$

$$-2 = \lg e^{-2} \le \lg x \le \lg e^{-1} = -1$$

$$0 < e^{-2} \le x \le e^{-1}$$

Es $4^x + 2^x - 2 \geq 0$

$4^x = (2^2)^x = 2^{2x} = (2^x)^2$

$(2^x)^2 + 2^x - 2 \geq 0$

$y = 2^x$ $\qquad$ $y^2 + y - 2 \geq 0$

$$y^2 + y - 2 \geq 0$$

$$y^2 + y - 2 = 0$$

$$y_{1,2} = \begin{cases} 1 \\ -2 \end{cases}$$

$$y = \frac{-1 \pm \sqrt{1+8}}{2} \begin{cases} 1 \\ -2 \end{cases}$$

&

$y \leq -2$ $\qquad$ $y \geq 1$

$2^x \leq -2$ $\qquad$ $2^x \geq 1$

$$\underbrace{0 < 2^x}_{} \leq -2$$

IMPOSSIBILE

$\nexists x$

$$2^x \geq 1 = 2^0$$

$$2^x \geq 2^0$$

$$\Downarrow$$

$$x \geq 0$$

$A > 0$

$$2^x \geq A = 2^{\log_2(A)}$$

$$2^a \geq 2^b$$

$$\Updownarrow$$

$$a \geq b$$

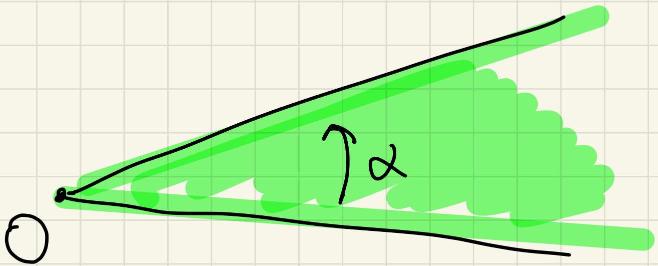
$2^x \geq -1$ vero $\forall x \in \mathbb{R}$

$2^x \geq 0$ vero $\forall x \in \mathbb{R}$

(perché $2^x > 0 \ \forall x$)

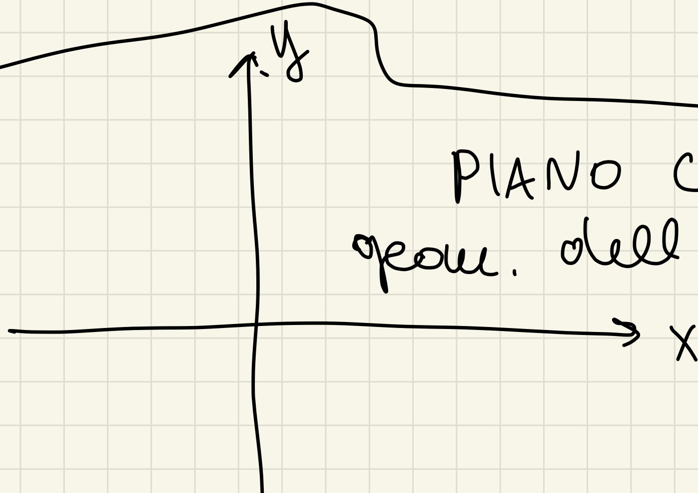
Richiami di trigonometria

misure degli angoli in RADIANTI

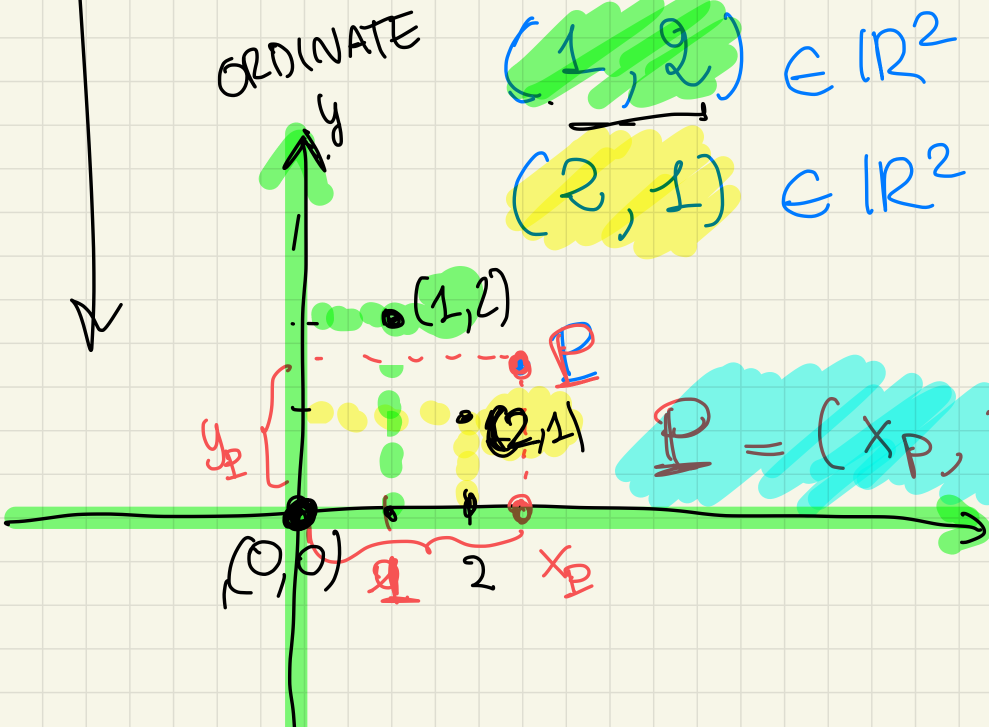


α = angolo è determinato da un vertice e 2 semirette che escono dal vertice

PIANO CARTESIANO = modello geom. dell'insieme $\mathbb{R} \times \mathbb{R} = \mathbb{R}^2$



$\mathbb{R} \times \mathbb{R} = \mathbb{R}^2 = \{$ coppie ORDINATE (x, y) con $x \in \mathbb{R}$, $y \in \mathbb{R} \}$



$(1, 2) \in \mathbb{R}^2$

$(2, 1) \in \mathbb{R}^2$

$(1, 2) \neq (2, 1)$

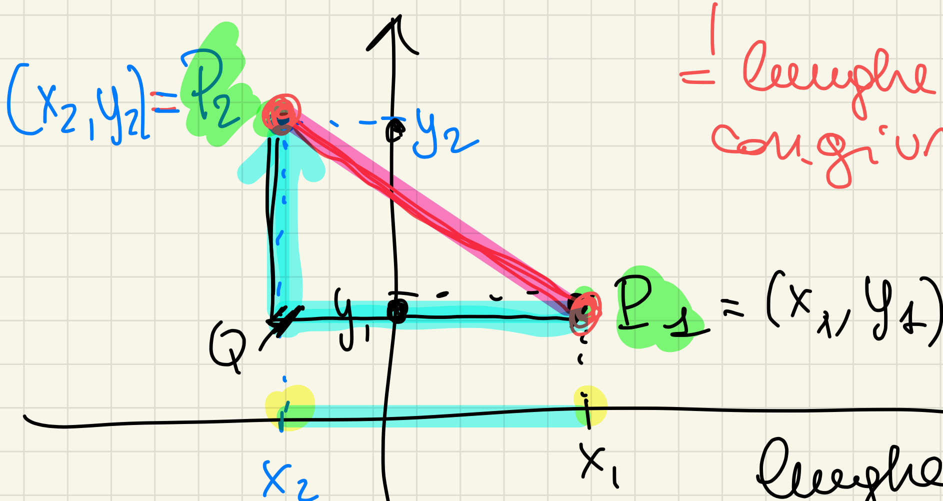
$x_P, y_P \in \mathbb{R}$

$P = (x_P, y_P) \in \mathbb{R}^2$

Su $\mathbb{R}^2$ ho struttura metrica (ho una DISTANZA)

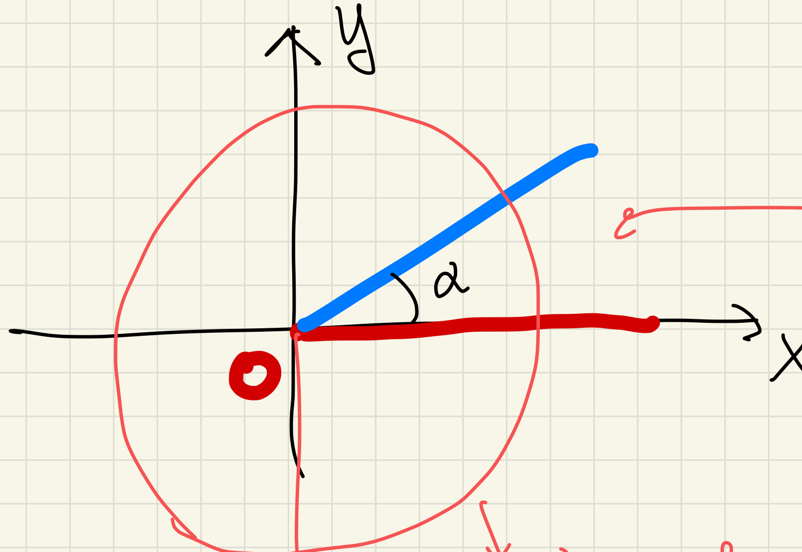
$\text{dist}((x_1,y_1),(x_2,y_2)) = ?$

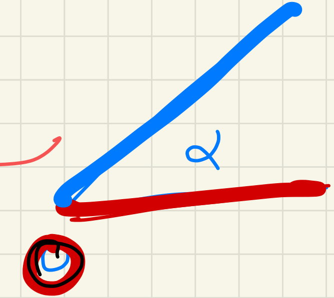
! = lunghezza SEGMENTO che congiunge P_1 e P_2



lunghezza SEGM. con estremi x_2 e x_1 = $|x_1-x_2|$

$$d((x_1,y_1),(x_2,y_2)) = d(P_1,P_2) = \sqrt{\boxed{|x_1-x_2|}^2 + |y_1-y_2|^2}$$





circonferenza di centro (0,0) e raggio 1

= per definizione =

$$= \left\{ (x,y) \in \mathbb{R}^2 \;\middle|\; \underbrace{\text{distanza}\big((x,y),(0,0)\big) = 1} \right\}$$

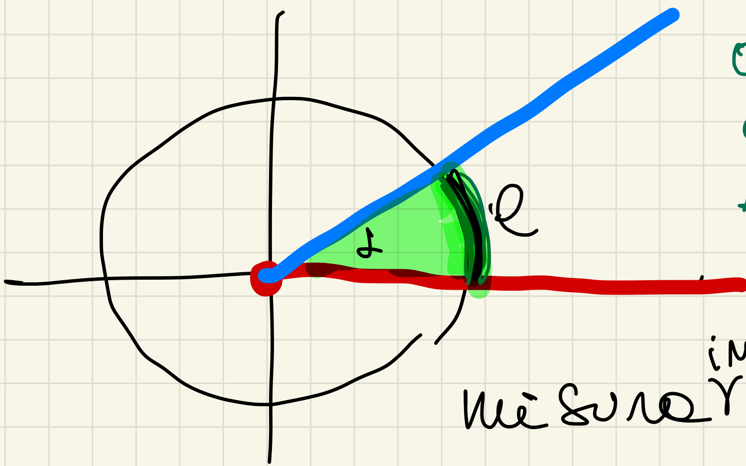
$$= \left\{ (x,y) \in \mathbb{R}^2 \;\middle|\; \sqrt{|x-0|^2 + |y-0|^2} = 1 \right\}$$

$$= \left\{ (x,y) \quad \left(\sqrt{x^2+y^2}\right)^2 = 1^2 \right\} =$$

$$|x|^2 = x^2$$

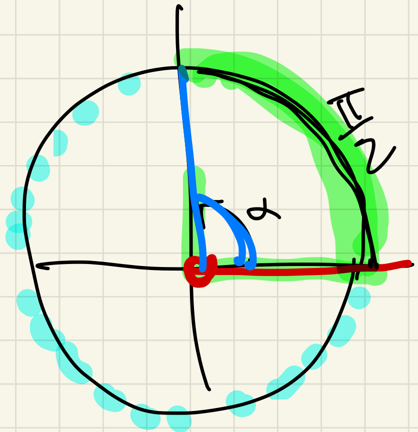
$$= \left\{ (x,y) \ , \ x^2+y^2 = 1 \right\}$$

PUNTI CIRCONF. di centro $(0,0)$ e raggio 1



angolo α taglia nella circonferenza un ARCO (verde) di lunghezza ℓ

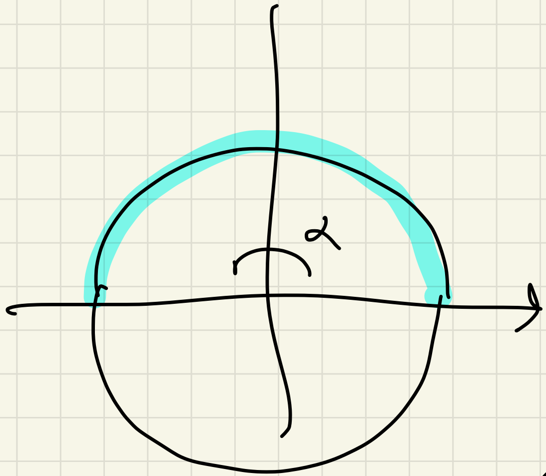
misura IN RADIANTI di α è ℓ



angolo retto in radianti
= lunghezza di
$\frac{1}{4}$ della lunghezza
della circonferenza

lungh. circonferenza è 2π

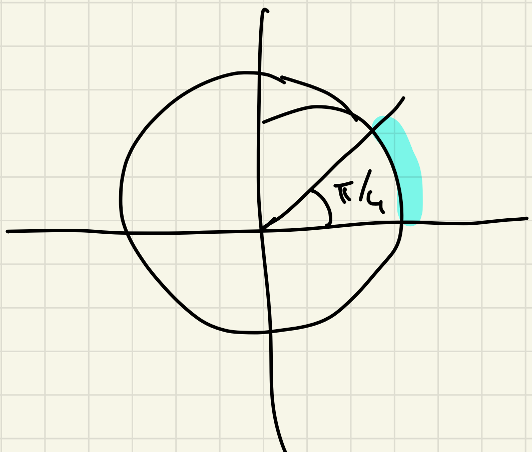
angolo retto $\frac{1}{4} \cdot 2\pi = \frac{\pi}{2}$



α angolo piatto =

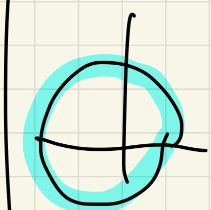
$$\frac{1}{2} \cdot 2\pi = \pi$$

(mezza circonferenza)



$$\frac{1}{8} \cdot 2\pi = \frac{\pi}{4}$$

angolo giro



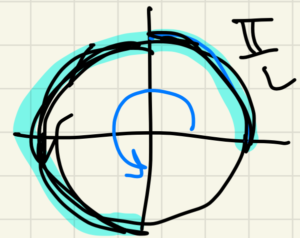
2π

angolo di $30^\circ \longrightarrow$ radianti ?

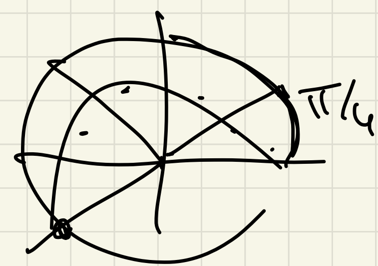
$60^\circ \longrightarrow$?

radianti:

$\frac{3}{2}\pi \longrightarrow$?



$\frac{5}{4}\pi \longrightarrow$?



$$\frac{3}{2}\pi = 3 \cdot \frac{\pi}{2}$$