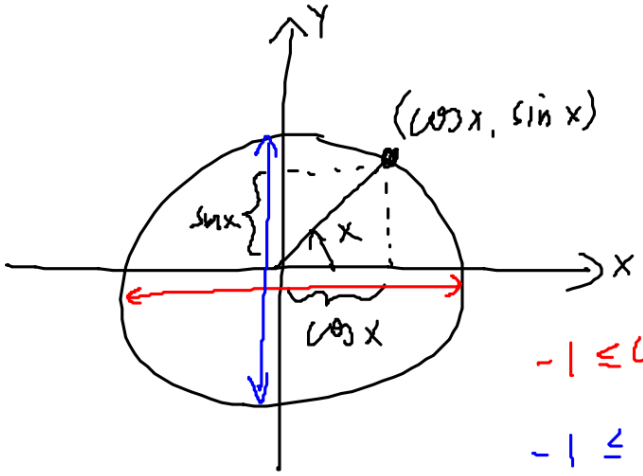
Sin x- ja cos x - yhtälöiden ratkaiseminen

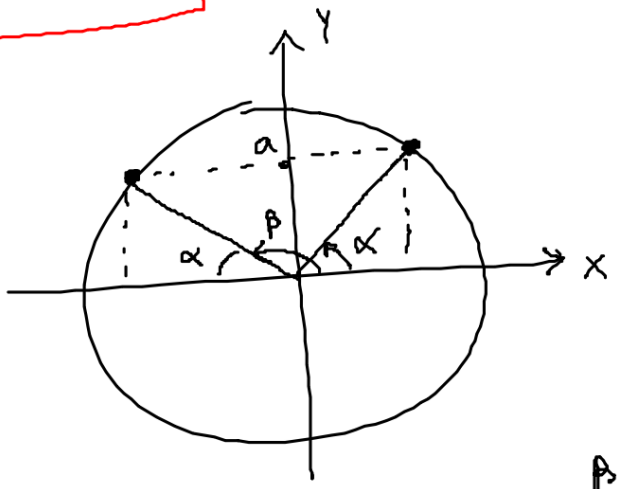
- sin x = x-kulmaan vast. ylösikkö-ympyrän kehäpisteen y-koord.
  cos x = —— // —— x-koord.



$-1 \leq \cos x \leq 1$

$-1 \leq \sin x \leq 1$

— $\sin x = a$ (= y-koord.) yhtälön ratkaiseminen



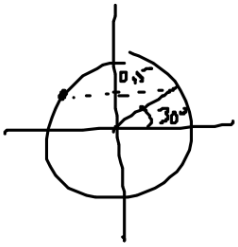
α- ja β -kulmat kelpaavat yhtälön $\sin x = a$ ratkaisuiksi ja

$\beta = 180° - \alpha$

n on kokon. luku

Lisäksi huomioitava täydet ympyrät !

Esim. $\sin x = 0{,}5$ yksi ratk. kulma MAB2:ssa

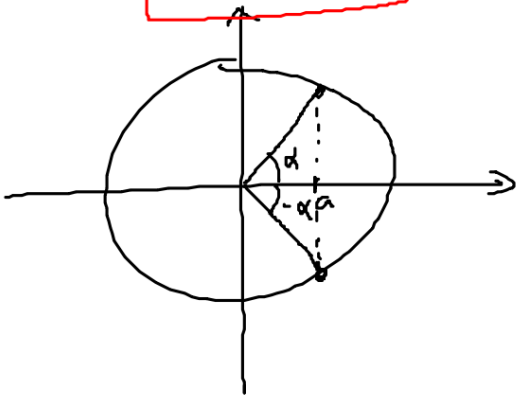


$\rightarrow x = \sin^{-1}(0{,}5) = 30°$

Myös vieruskulma $= 180° - 30° = 150°$

ja lisäksi täydet ymp. $\rightarrow$ $x = 30° + n\,360°$ tai $x = 150° + n\,360°$

— yhtälön $\cos x = a$ ratk.



ratk. laskimesta saatu α:

$$x = \alpha + n360^\circ \quad \text{tai}$$
$$x = -\alpha + n360^\circ$$

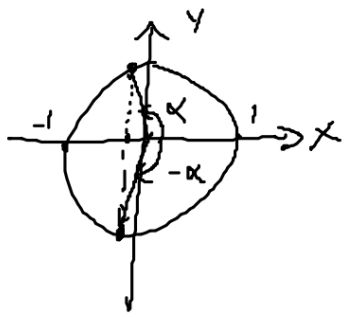
Esim. $3\cos x = 2 \quad /:3$

$\cos x = \frac{2}{3}$

$x = \cos^{-1}\left(\frac{2}{3}\right) \approx 48{,}2^\circ$

V: $x = 48{,}2^\circ + n360^\circ$ tai $-48{,}2^\circ + n360^\circ$

190. a) $\cos\alpha = -0{,}19$



Laskimella $\alpha = \cos^{-1}(-0{,}19)$

$\alpha = 100{,}95°$

V: $\alpha = 100{,}95° + n360°$ tai

$\alpha = -100{,}95° + n360°$

191. a) $5 \cdot \sin\alpha = 1 \quad /\!/ :5$

$\sin\alpha = \frac{1}{5} \xrightarrow{\text{Laskin}} \alpha = \sin^{-1}\left(\frac{1}{5}\right) \approx 11{,}54°$

V: $\alpha = 11{,}54° + n360°$ tai

$\alpha = 180° - 11{,}54° + n360° = 168{,}46° + n360°$

194. $3\cos 2\alpha + 1 = 0$

$3\cos 2\alpha = -1 \quad /\!/ :3$

$\cos 2\alpha = -\frac{1}{3}$

$2\alpha = \cos^{-1}\left(-\frac{1}{3}\right) \approx 109{,}47^\circ$

$\rightarrow 2\alpha = 109{,}47^\circ + n\,360^\circ$ tai

$\rightarrow 2\alpha = -109{,}47^\circ + n\,360^\circ \quad /\!/ :2$

V: $\alpha = 54{,}74^\circ + n\,180^\circ$ tai

$\alpha = -54{,}74^\circ + n\,180^\circ$