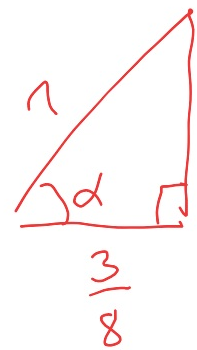
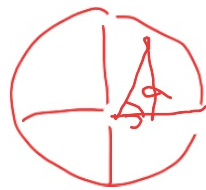


4.14 Tylpän kulman α sini on $\frac{2}{9}$. Määritä kulman $\pi - \alpha$ kosinin tarkka arvo.

4.15 Määritä lausekkeen $2\sin\alpha + 4\cos\alpha$ tarkka arvo, kun $\cos\alpha = \frac{3}{8}$ ja kulma α on

a) I b) IV neljänneksessä.

13.



$x = \sin\alpha$

$$x^2 + \left(\frac{3}{8}\right)^2 = 1^2$$

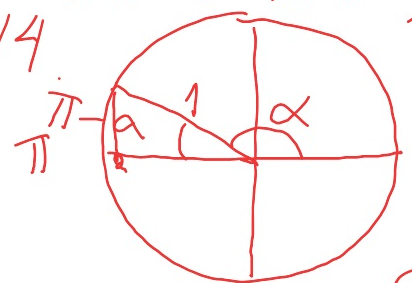
$$x^2 = 1 - \frac{9}{64} = \frac{55}{64}$$

$$x = \pm \frac{\sqrt{55}}{8}$$

a) $2 \cdot \frac{\sqrt{55}}{8} + 4 \cdot \frac{3}{8} = \dots$

b) $2 \cdot \left(-\frac{\sqrt{55}}{8}\right) + 4 \cdot \frac{3}{8} = \dots$

14



II neljänneksessä

$$\cos\alpha < 0 \Rightarrow \sqrt{77}$$

$$\cos(\pi - \alpha) = -\frac{\sqrt{77}}{9}$$

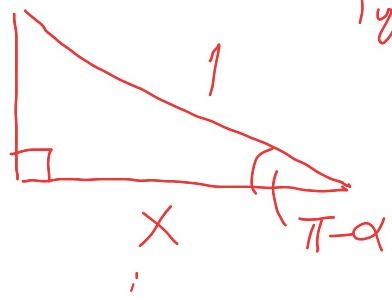
Pythagoras

$$x^2 + \left(\frac{2}{9}\right)^2 = 1^2$$

$$x^2 = 1 - \frac{4}{81} = \frac{77}{81}$$

$$x = \pm \sqrt{\frac{77}{81}} = \pm \frac{\sqrt{77}}{9}$$

2/9

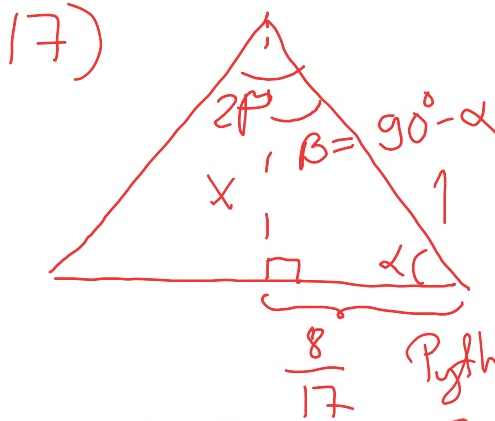


4.16 Määritä lausekkeen $10\sin^2\alpha - 3\cos 2\alpha$ arvo,
 kun $\sin\alpha = -\frac{3}{4}$.

$$\cos 2x = \cos^2 x - \sin^2 x = 2\cos^2 x - 1 = 1 - 2\sin^2 x$$

4.17 Tasakylkisen kolmion kantakulman kosini
 on $\frac{8}{17}$. Laske huippukulman sini.

16) $10(\sin\alpha)^2 - 3\cos 2\alpha = 10(\sin\alpha)^2 - 3(1 - 2(\sin\alpha)^2) =$
 $10(\sin\alpha)^2 - 3 + 6(\sin\alpha)^2 = 16(\sin\alpha)^2 - 3 = 10 \cdot \left(-\frac{3}{4}\right)^2 - 3$
 $= \frac{90}{16} - 3 = \frac{42}{16} = \frac{21}{8}$



$$\sin\beta = \frac{8}{17}$$

$$\sin 2\beta = 2\sin\beta \cos\beta = 2 \cdot \frac{8}{17} \cdot \frac{15}{17} = \frac{240}{289}$$

$$\sin 2x = 2\sin x \cos x$$

Pythagoras:

$$x^2 + \left(\frac{8}{17}\right)^2 = 1^2$$

$$x^2 = 1 - \frac{64}{289} = \frac{225}{289} \Leftrightarrow x = \frac{15}{17}$$

$$x = \cos\beta$$

Sinihyönläkö

Esim. Ratkaise x kun

$$\sin x = \frac{1}{\sqrt{2}}$$

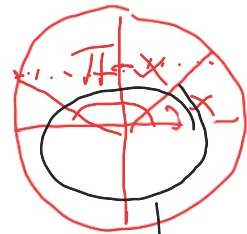
"Haetaan ensin ylin kulma"

$$x = \frac{\pi}{4} + m \cdot 2\pi \quad \vee \quad x = \left(\pi - \frac{\pi}{4}\right) + m \cdot 2\pi, \quad m \in \mathbb{Z}$$

$$x = \frac{\pi}{4} + m \cdot 2\pi \quad \vee \quad x = \frac{3\pi}{4} + m \cdot 2\pi, \quad m \in \mathbb{Z}$$

jälkso

Asteet	Radiaanit	sin
45	$\frac{\pi}{4}$	$\frac{1}{\sqrt{2}}$



"
tiedet kierroset"
 $m \cdot 2\pi$
 $m \cdot 360^\circ$ } $m \in \mathbb{Z}$

$$\text{Erim. } 7 \sin x = 2 \quad || : 7$$

$$\sin x = \frac{2}{7} \quad (\text{ü tavalikad arvad})$$

$$x = 16,6^\circ + m \cdot 360^\circ \vee x = (180^\circ - 16,6^\circ) + m \cdot 360^\circ, m \in \mathbb{Z}$$

$$x = 0,29 + m \cdot 2\pi \vee x = (\pi - 0,29) + m \cdot 2\pi, m \in \mathbb{Z}$$

(3,14 - 0,29)

`arcsin(2/7)`

`= 0,28975170143604747094`