

КОТТЕЖ. 11-18

тект. 6 →

$$\textcircled{11} \begin{cases} a-2+bi \\ 6+2i \end{cases}$$

Re & Im-osat oltarc
Samet

$$a-2=6 \Rightarrow a=6+2=8$$

$$b=2$$

$$a=1 \quad b=2 \quad c=5$$

$\textcircled{12}$ c.

$$x^2 + 2x + 5 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-2 \pm \sqrt{2^2 - 4 \cdot 1 \cdot 5}}{2} = \frac{-2 \pm \sqrt{-16}}{2}$$

↙ $D < 0$
 $i^2 = -1$
 $16 = 4^2$

$$= \frac{-2 \pm \sqrt{4^2 \cdot 4^2}}{2} = \frac{-2 \pm 4i}{2} = \begin{cases} -1 + 2i \\ -1 - 2i \end{cases}$$

a. $x^2 = -4$

$$x = \pm \sqrt{-4} = \pm 2i$$

b. $\pm \sqrt{\frac{7}{3}} i$

d. $\begin{cases} -\frac{3}{2} + \frac{\sqrt{7}}{2} i \\ -\frac{3}{2} - \frac{\sqrt{7}}{2} i \end{cases}$

$$(13) \quad (3+2i) + (-1+4i) = 2+6i$$

$$(3+2i) - (-1+4i) = 4-2i$$

$$(3+2i)(-1+4i) = -3 + 12i - 2i + 8i^2 \quad i^2 = -1$$

$$= -3 + 10i - 8$$

$$= 10i - 11$$

$$\frac{-1-4i}{(3+2i)} = \frac{(3+2i)(-1-4i)}{(-1+4i)(-1-4i)} = \frac{-3-12i-2i-8i^2}{1+4i-4i-16i^2}$$

$$= \frac{5-14i}{1+16} = \frac{5-14i}{17} = \frac{5}{17} - \frac{14}{17}i$$

$$z = -1+4i$$

$$z^* = \bar{z} = -1-4i$$

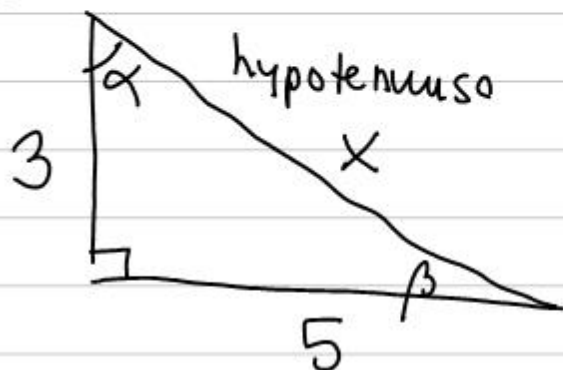
$$a^2+b^2 \quad (-1)^2+4^2$$

$$(a^2+b^2)$$

$$(14) \quad z = 3+3i \quad z z^* = (3+3i)(3-3i) = 3^2+3^2$$

$$z^* = 3-3i \quad = 18$$

15



$$a^2 + b^2 = c^2$$

$$x^2 = 3^2 + 5^2$$

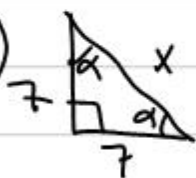
$$x = \sqrt{9 + 25} = \sqrt{34}$$

$$\tan \alpha = \frac{5}{3} \Rightarrow \alpha = \tan^{-1}\left(\frac{5}{3}\right) = 59^\circ$$

$$\tan \beta = \frac{3}{5} \Rightarrow \beta = \tan^{-1}\left(\frac{3}{5}\right) = 31^\circ$$

$$\downarrow \text{bbb} \\ 1.6 + \boxed{\text{INV}} + \boxed{\text{TAN}} =$$

16



$$x = \sqrt{98}$$

$$\alpha = 45^\circ$$

17

$$r = 2 \text{ cm}$$

$$d = 2r = 2 \cdot 2 = 4 \text{ cm}$$

$$C = 2\pi r = 2 \cdot \pi \cdot 2 = 4\pi \approx 12.56 \text{ cm}$$

$$A = \pi r^2 = \pi \cdot 2^2 = 4\pi \approx 12.56 \text{ cm}^2$$

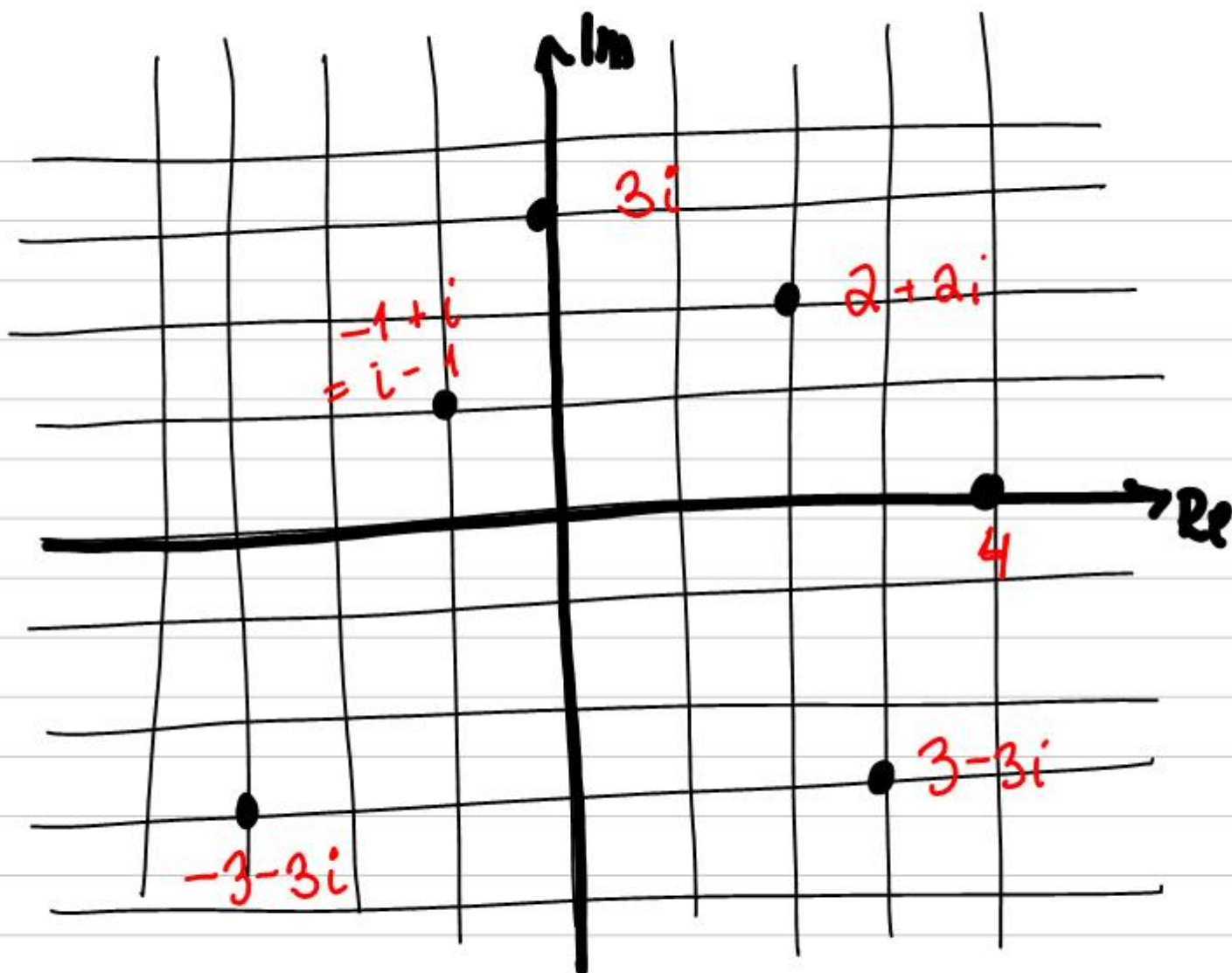
18

$$r = 1$$

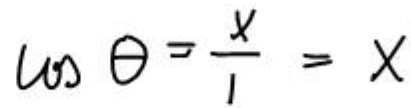
$$d = 2$$

$$C = 2\pi$$

$$A = \pi$$



9



$$\sin \theta = \frac{y}{1} = y$$

$$\tan \theta = \frac{y}{x}$$

$$\omega t \quad \theta = \frac{x}{y}$$

positiivinen kiertosuunta hypotenuusa = 1 (yksikköympyrä)

The diagram shows a unit circle with the following features:

- A horizontal axis labeled \cos and a vertical axis labeled \sin .
- A point at $(1, 0)$ labeled 0° and 360° .
- A point at $(0, 1)$ labeled 90° .
- A point at $(-1, 0)$ labeled 180° .
- A point at $(0, -1)$ labeled 270° and -90° .
- A red arc in the first quadrant labeled θ .
- A green arc in the fourth quadrant labeled θ .
- A purple line segment from the center to the 90° point.
- A green line segment from the center to the 0° point.

$\cos 0^\circ = 1$
 $\sin 0^\circ = 0$
 $\cos 90^\circ = 0$
 $\sin 90^\circ = 1$
 $\cos 270^\circ = 0$
 $\sin 270^\circ = -1$
 $\cos (-90^\circ) = 0$
 $\sin (-90^\circ) = -1$

$$\cos 0^0 = 1$$

$$\sin 0^\circ = 0$$

$$\cos 90^\circ = 0$$

$$\sin 90^\circ = 1$$

$$\cos 270^\circ = 0$$

$$\sin 270^\circ = -1$$

$$\cos(-90^\circ) = 0$$

$$\sin(-90^\circ) = -1$$

20

Pythagoras

$$x^2 + y^2 = 1^2$$

$$x = y$$

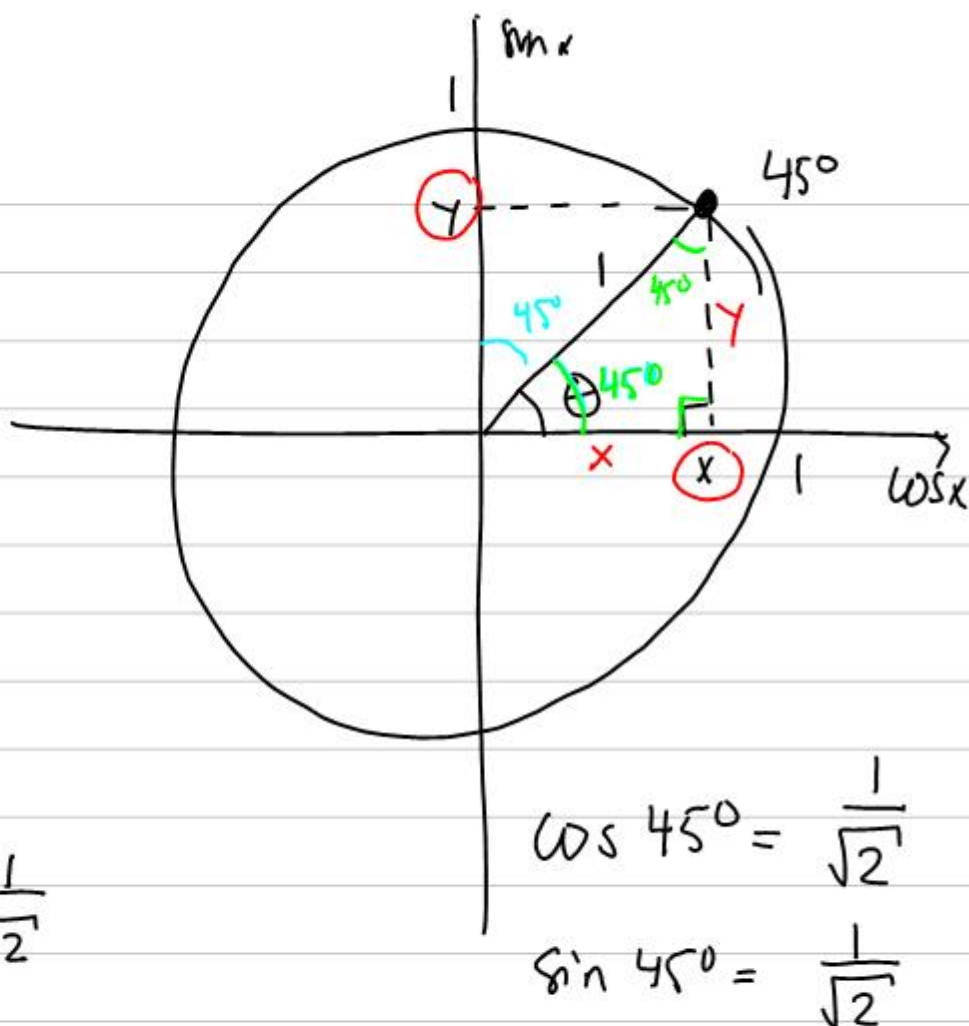
$$x^2 + x^2 = 1$$

$$2x^2 = 1$$

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

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

$$y = \frac{1}{\sqrt{2}}$$



$$\cos 45^\circ = \frac{1}{\sqrt{2}}$$

$$\sin 45^\circ = \frac{1}{\sqrt{2}}$$

20

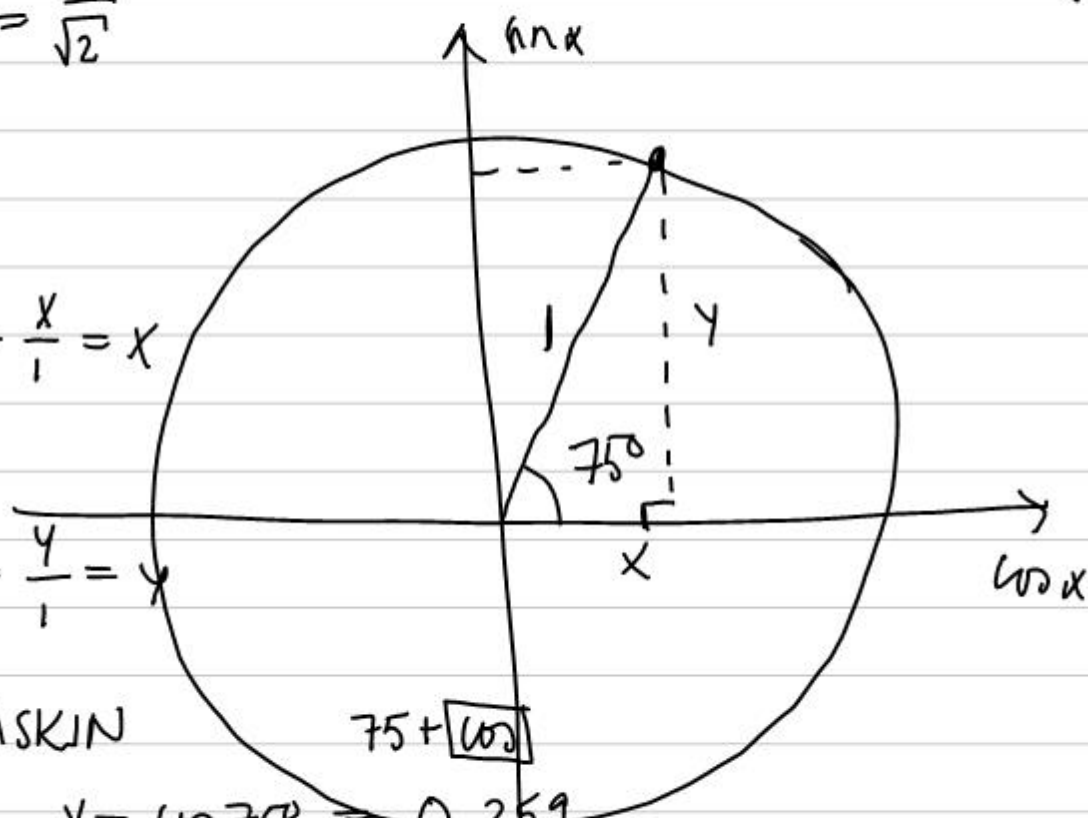
$$\cos 75^\circ = \frac{x}{1} = x$$

$$\sin 75^\circ = \frac{y}{1} = y$$

LASKIN

$$x = \cos 75^\circ = 0.259$$

$$y = \sin 75^\circ = 0.966$$



LASKIN

DEG -tilo

asteet

$$\cos 0^\circ$$

$$\cos 90^\circ$$

$$\tan \alpha = 1$$

$$\alpha = \dots 45^\circ$$

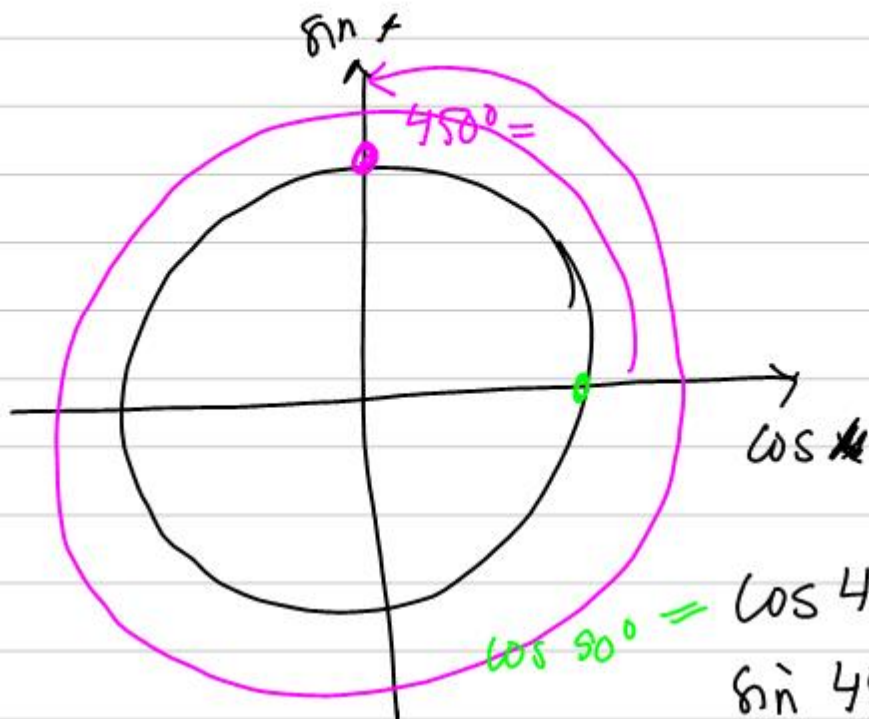
RAD -tilo

GRAD -tilo

$$0 + \boxed{\cos} = 1$$

$$90 + \boxed{\cos} = 0$$

(21)



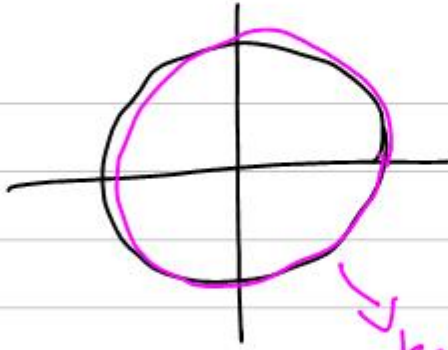
$$\cos 90^\circ = \cos 450^\circ = 0$$

$$\sin 450^\circ = 1$$

$$\cos 0^\circ = \cos 720^\circ = 1$$

$$\sin 720^\circ = 0$$

22



$\text{Scale} \Rightarrow r = 1$

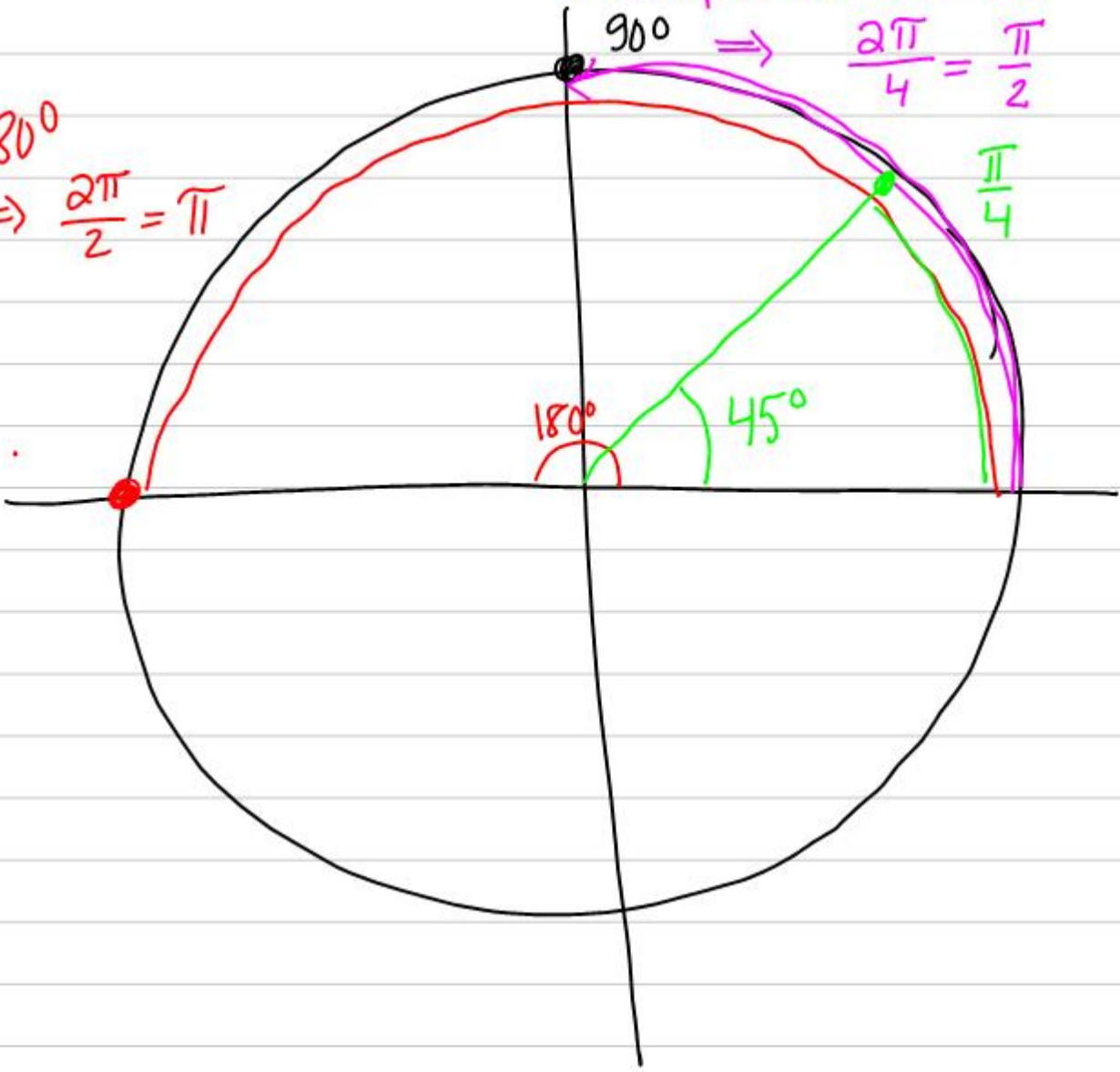
$$C = 2\pi r = 2\pi$$

kekon pitarus on 2π

$$90^\circ \Rightarrow \frac{2\pi}{4} = \frac{\pi}{2}$$

$$\Rightarrow \frac{2\pi}{2} = \pi$$

$\frac{\pi}{4}$



(23)

$$360^\circ = 2\pi$$

$$180^\circ = \pi \text{ rad}$$

$$1^\circ = \frac{\pi}{180} \text{ rad}$$

$$360^\circ = 360 \cdot \frac{\pi}{180} \text{ rad} = 2\pi \text{ rad}$$

$$180^\circ = \pi$$

$$180^\circ = 180 \cdot \frac{\pi}{180} \text{ rad} = \pi \text{ rad}$$

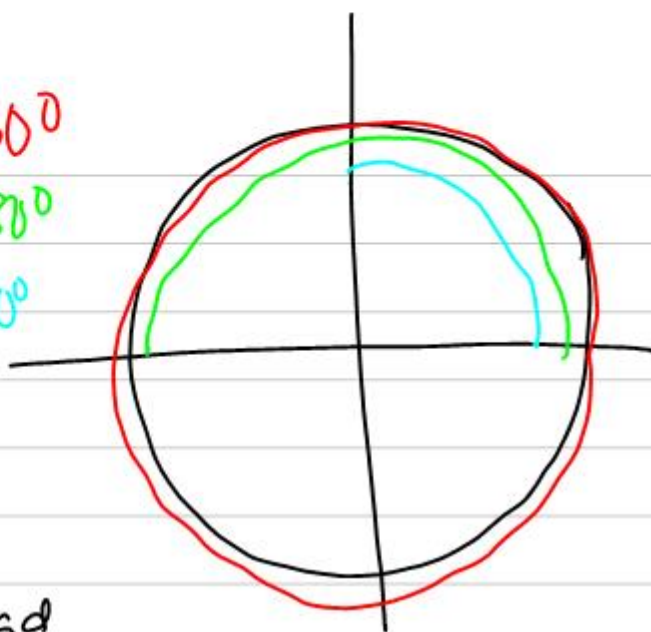
$$90^\circ = \frac{\pi}{2}$$

$$90^\circ = 90 \cdot \frac{\pi}{180} \text{ rad} = \frac{\pi}{2} \text{ rad}$$

360°

180°

90°



(24) $-90^\circ = -\frac{\pi}{2} \text{ rad}$

$$-180^\circ = -\pi \text{ rad}$$

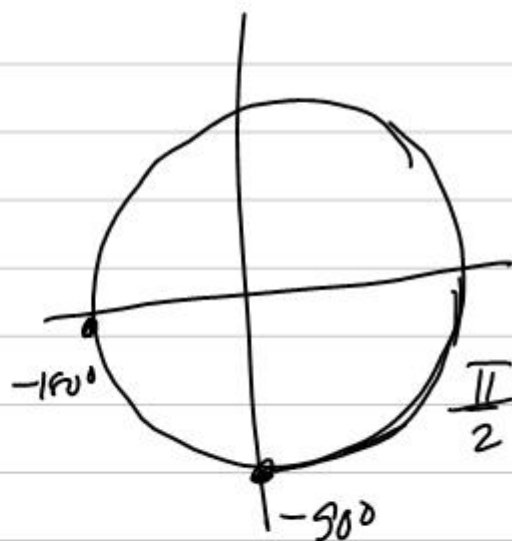
(25)

$$180^\circ = \pi \text{ rad}$$

$$1^\circ = \frac{\pi}{180} \text{ rad}$$

$$45^\circ = 45 \cdot \frac{\pi}{180} \text{ rad} = \frac{\pi}{4} \text{ rad}$$

$$7^\circ = 7 \cdot \frac{\pi}{180} \text{ rad} = \frac{7}{180} \pi \text{ rad} \approx 0.122 \text{ rad}$$



$$\frac{45}{x} = \frac{180}{\pi} \quad \nearrow \searrow$$

26

$$\pi \text{ rad} = 180^\circ$$

$$\boxed{1 \text{ rad} = \frac{180^\circ}{\pi}}$$

$$1 \text{ rad} = \frac{180^\circ}{\pi} \approx 57.3^\circ$$

$$\frac{\pi}{2} \text{ rad} = 90^\circ$$

$$\frac{\pi}{2} = \frac{\cancel{\pi}}{2} \cdot \frac{180^\circ}{\cancel{\pi}} = 90^\circ$$

$$\frac{\pi}{6} \text{ rad} = \frac{\cancel{\pi}}{6} \cdot \frac{180^\circ}{\cancel{\pi}} = 30^\circ$$

$$2 \text{ rad} = 2 \cdot \frac{180^\circ}{\pi} = \frac{360^\circ}{\pi} \approx 114^\circ$$

$$0.5 \text{ rad} = 0.5 \cdot \frac{180^\circ}{\pi} = \frac{90^\circ}{\pi} \approx 28.7^\circ$$

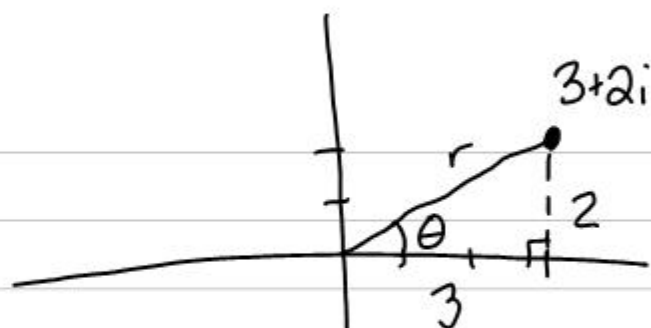
(28) a. $r < \theta$

$$r^2 = 2^2 + 3^2$$

$$r = \sqrt{2^2 + 3^2} = \sqrt{13} \approx 3.61$$

$$\tan \theta = \frac{2}{3} \Rightarrow \theta = \tan^{-1}\left(\frac{2}{3}\right)$$

$$\theta = 33.7^\circ$$



LASKIN
 $\boxed{\text{DEG}}$ -tila

$$\Rightarrow r < \theta$$

$$3.61 < 33.7^\circ$$

(29) a. $r = \sqrt{13} \approx 3.61$

RADIAANIT: $\boxed{\text{RAD}}$ -tila

$$\tan \theta = \frac{2}{3} \Rightarrow \theta = \tan^{-1}\left(\frac{2}{3}\right)$$

$$\theta = 0.59 \text{ rad}$$

$$\Rightarrow 3.61 < 0.59$$

KOHTIET. 28, 29

33-36