KOTITEHT. 11-18

teht. 6 →

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

Re & Im -osat oltava samat

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

$b=2$

(12) c. $a=1 \quad b=2 \quad c=5$

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

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

$=\frac{-2\pm\sqrt{2^2-4\cdot1\cdot5}}{2}=\frac{-2\pm\sqrt{-16}}{2}$ ← $D<0$

$i^2=-1$

$16=4^2$

$=\frac{-2\pm\sqrt{i^2\cdot4^2}}{2}=\frac{-2\pm4i}{2}=\begin{cases} -1+2i \\ -1-2i \end{cases}$

a. $x^2=-4$

$x=\pm\sqrt{-4}=\pm2i$

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

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

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

$= -3+10i-8$

$= 10i-11$

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

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

$z = -1+4i$

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

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

(14) $z = 3+3i$

$z^* = 3-3i$

$zz^* = (3+3i)(3-3i) = 3^2+3^2$

$= 18$

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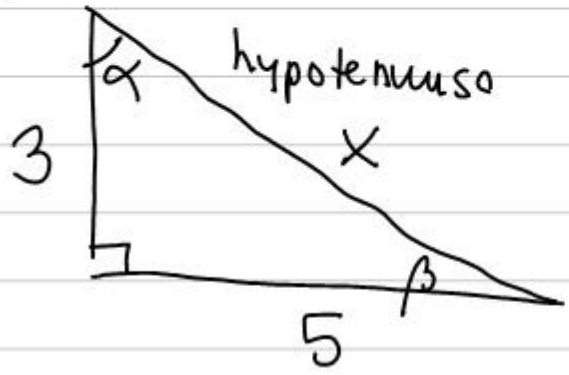


$a^2+b^2=c^2$

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

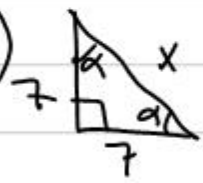
$x=\sqrt{9+25}=\sqrt{34}$

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

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

1.6^{666} + INV + TAN =

16



$x=\sqrt{98}$

$\alpha=45°$

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$r=2$ cm

$d=2r=2\cdot2=4$ cm

$C=2\pi r=2\cdot\pi\cdot2=4\pi\approx12.56$ cm

$A=\pi r^2=\pi\cdot2^2=4\pi\approx12.56$ cm^2

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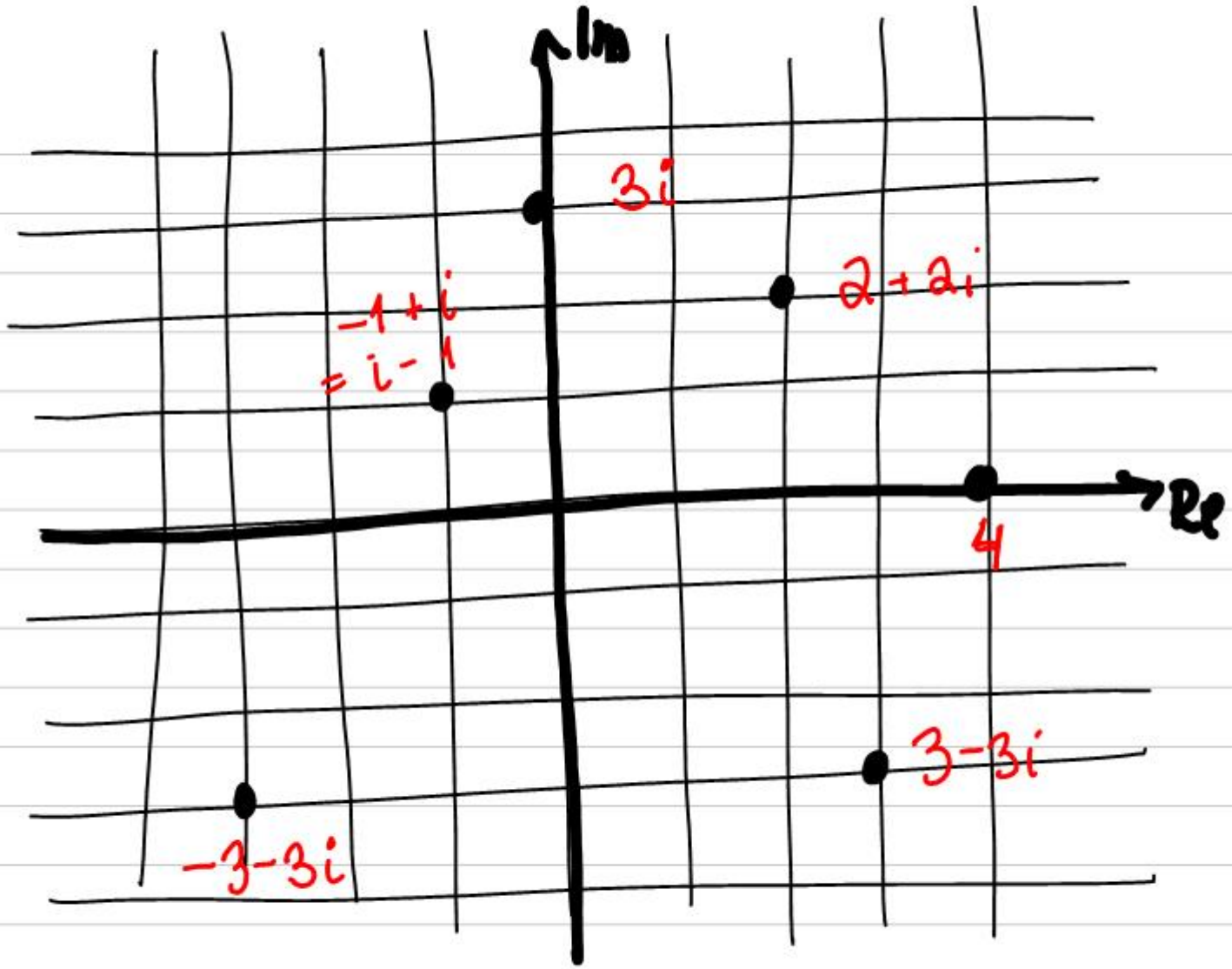
$r=1$

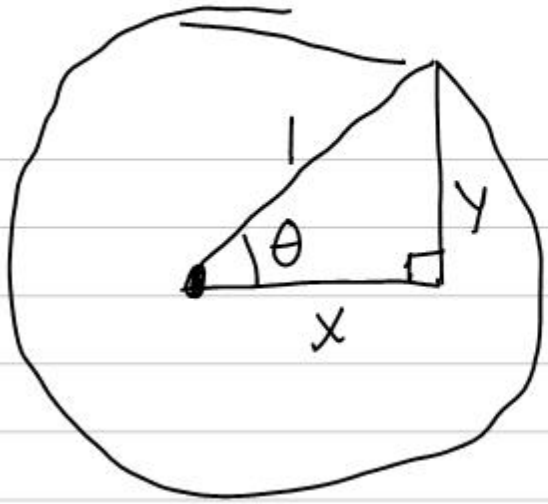
$d=2$

$C=2\pi$

$A=\pi$



(9)



$\cos\theta = \frac{x}{1} = x$

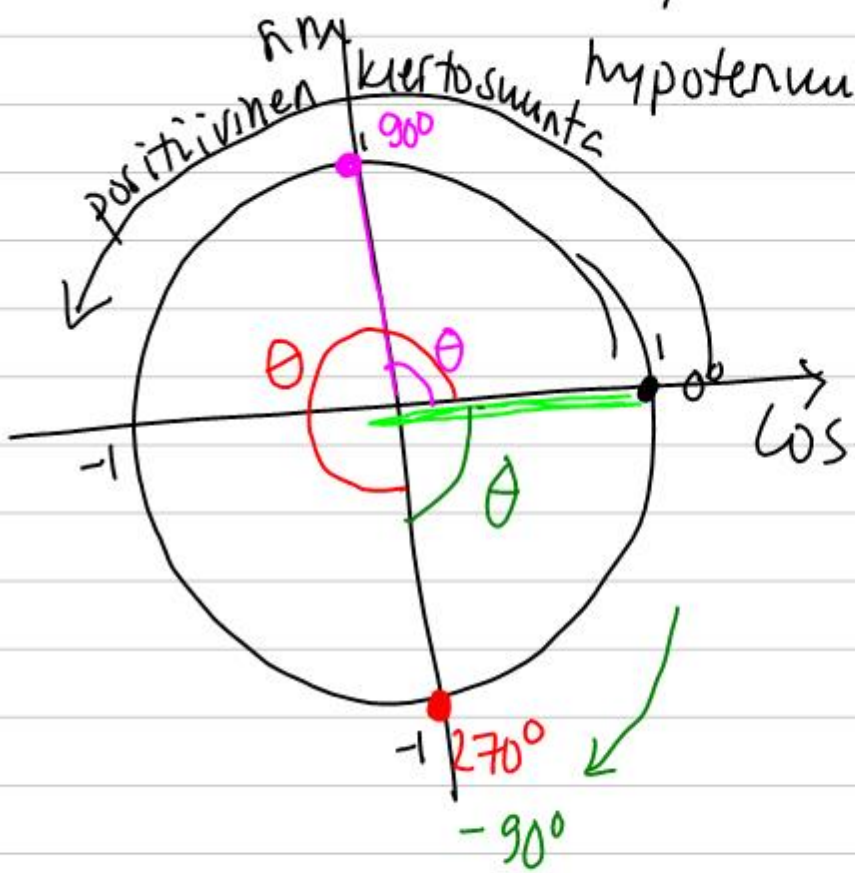
$\sin\theta = \frac{y}{1} = y$

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

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

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

↑ hypotenuusa = 1 (yksikköympyrä)



$\cos 0° = 1$

$\sin 0° = 0$

$\cos 90° = 0$

$\sin 90° = 1$

$\cos 270° = 0$

$\sin 270° = -1$

$\cos(-90°) = 0$

$\sin(-90°) = -1$

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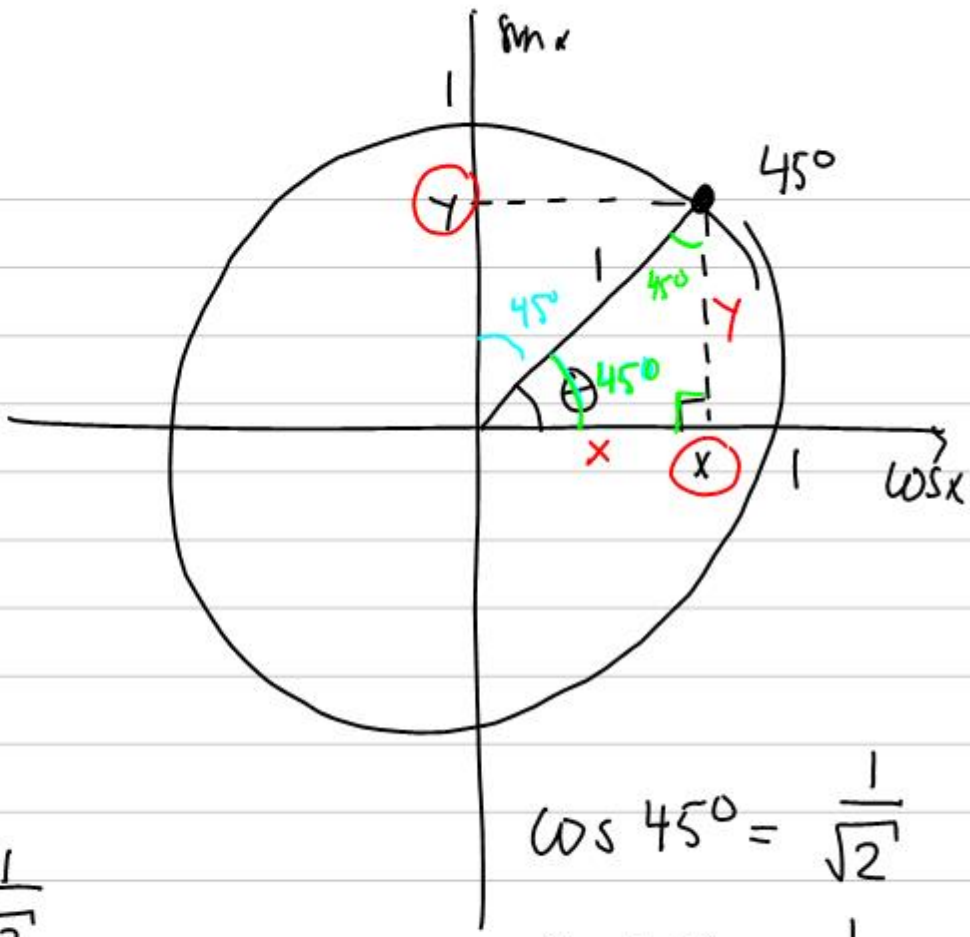

Pythagoras

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

$x = y$

$x^2 + x^2 = 1$

$2x^2 = 1$

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

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

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

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

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

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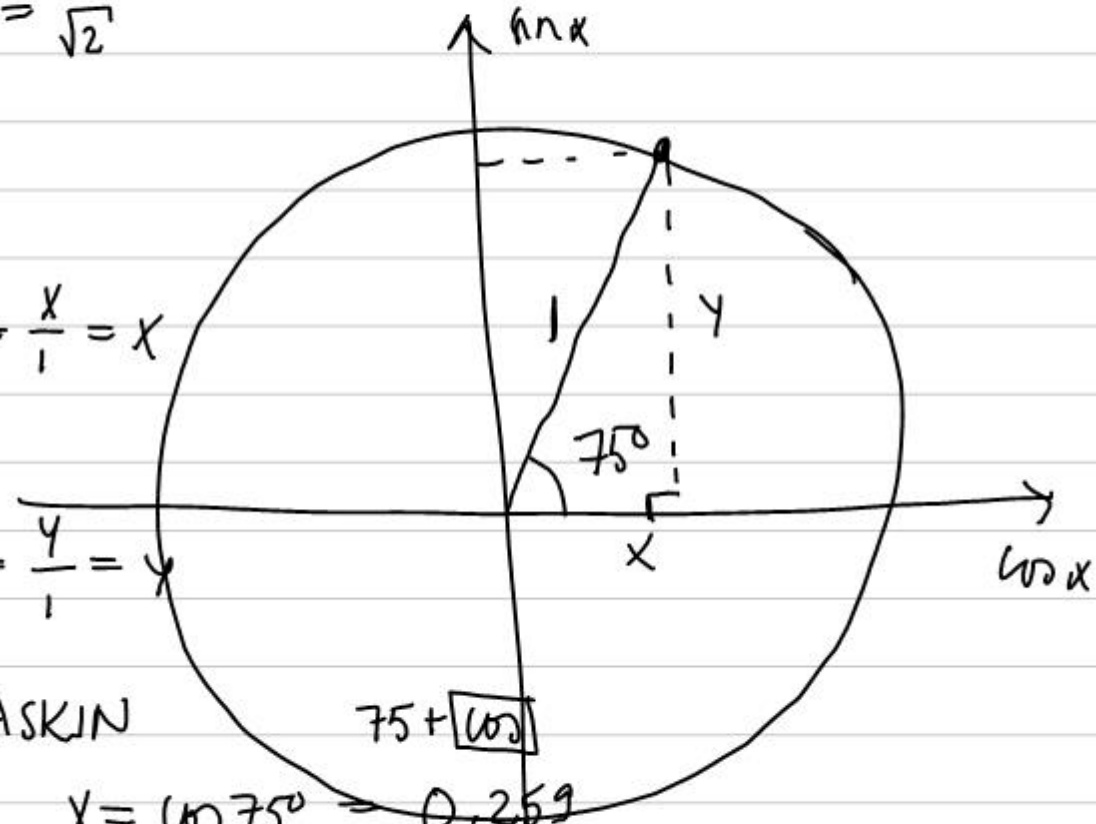

$\cos 75^\circ = \frac{x}{1} = x$

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

LASKIN

$x = \cos 75^\circ = 0.259$ (75 + cos)

$y = \sin 75^\circ = 0.966$ (75 + sin)

LASKIN

DEG-tila

asteet

cos 0°

cos 90°

tan α = 1

α = ... 45°

RAD-tila

GRAD-tila

0 + cos = 1

90 + cos = 0

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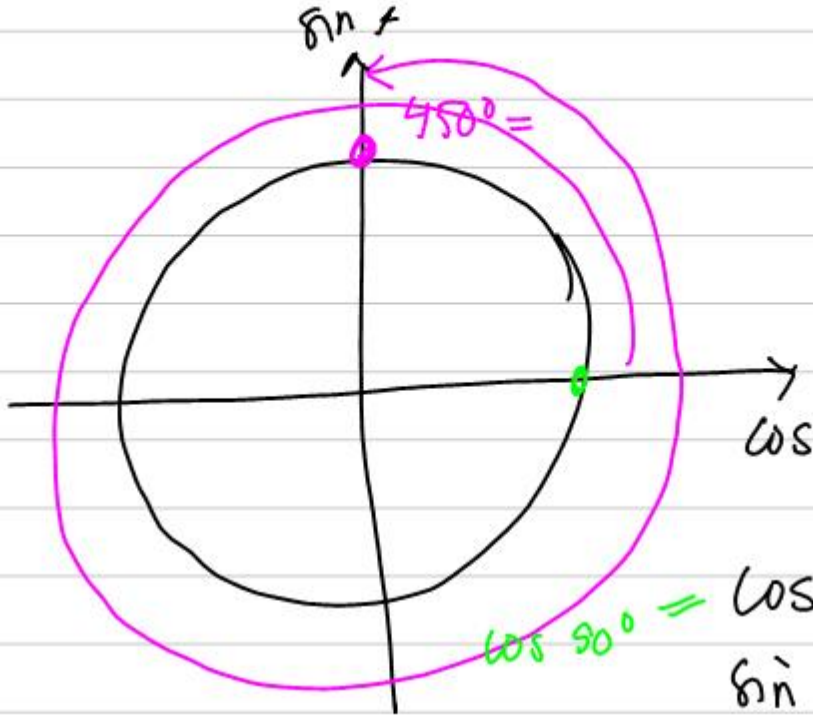


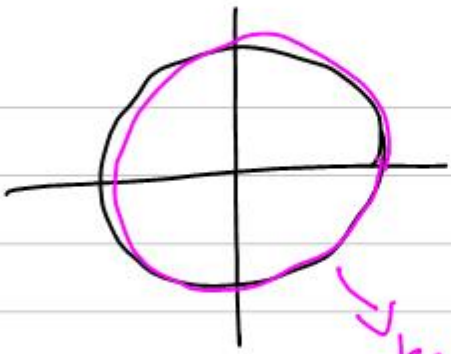
cos 90° = cos 450° = 0

sin 450° = 1

cos 0° = cos 720° = 1

sin 720° = 0

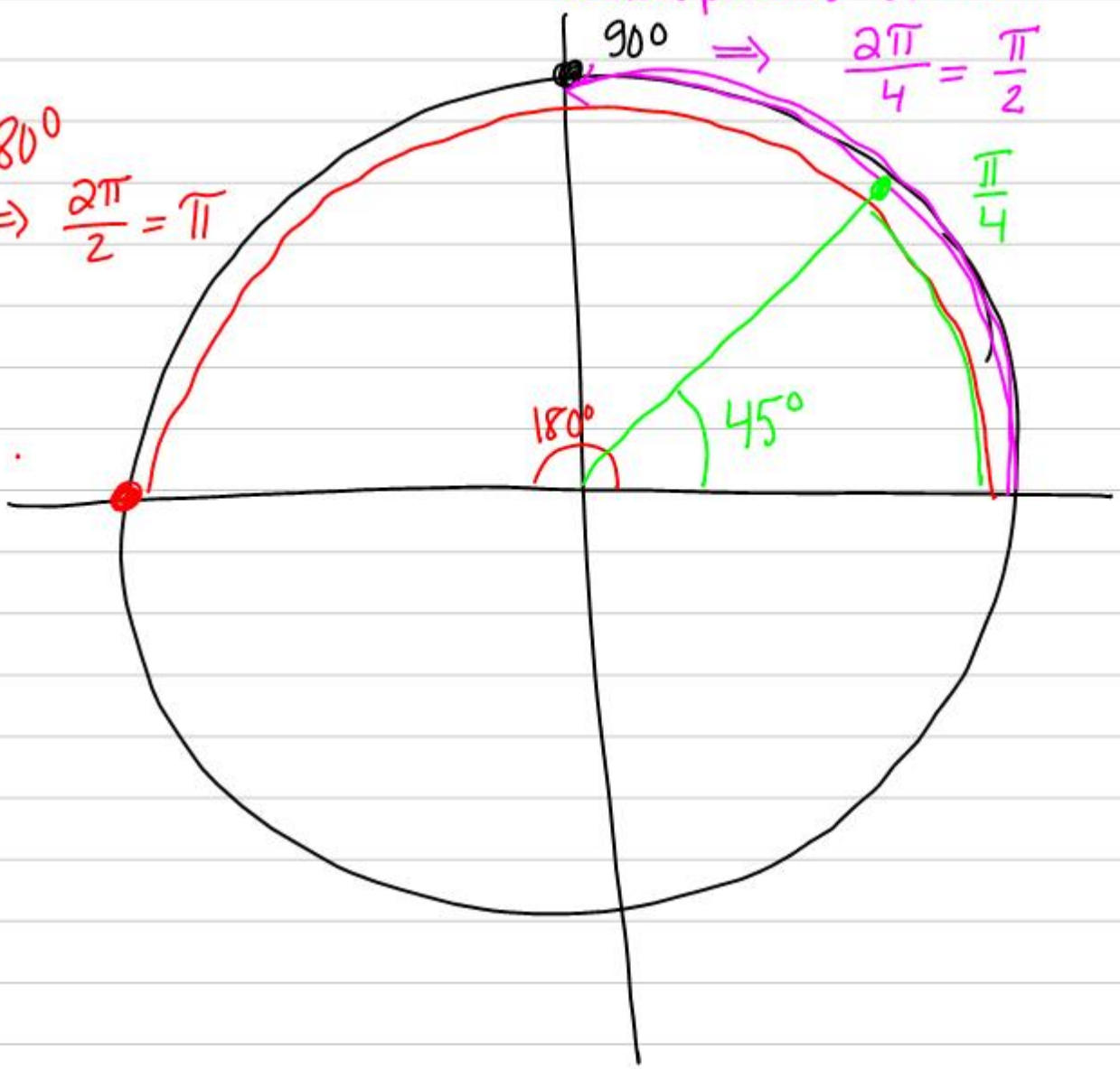
22



Scale → $r = 1$

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

keliling pitrus on 2π

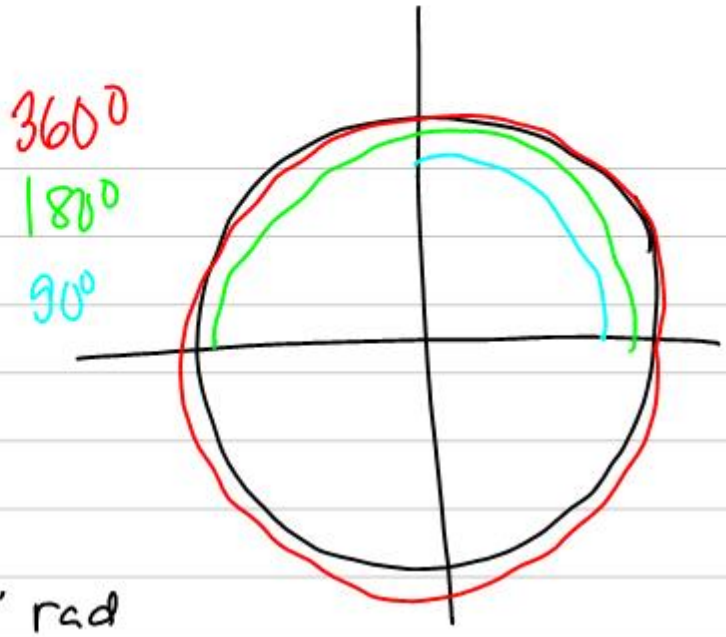


$90^\circ \Rightarrow \frac{2\pi}{4} = \frac{\pi}{2}$

$180^\circ \Rightarrow \frac{2\pi}{2} = \pi$

$\frac{\pi}{4}$

(23)



$360^\circ = 2\pi$

$180^\circ = \pi$ rad

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

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

$180^\circ = \pi$

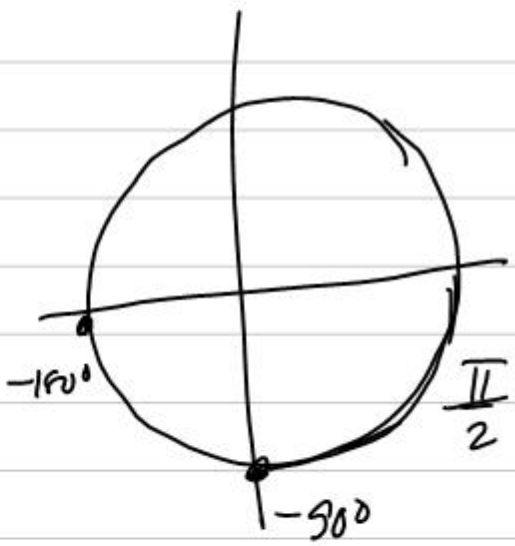
$180^\circ = 180 \cdot \frac{\pi}{180}\text{ rad} = \pi$ rad

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

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

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

$-180^\circ = -\pi$ rad



(25) $180^\circ = \pi$ rad

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

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

$\frac{45}{x} = \frac{180}{\pi}$

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

(26)

π rad $= 180^\circ$

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

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

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

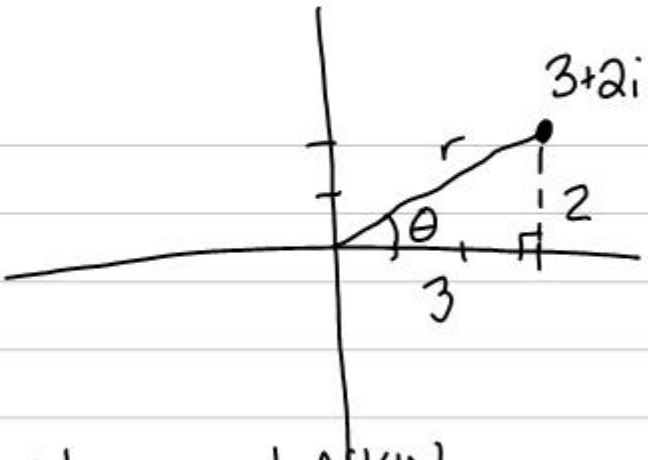
$$\frac{\pi}{2} = \frac{\pi}{2} \cdot \frac{180^\circ}{\pi} = 90^\circ$$

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

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

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

(28) a. $r \angle \theta$



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

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

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

$\theta = 33.7^\circ$

LAIKIN DEG-tila

$\Rightarrow \quad r \angle \theta$

$3.61 \angle 33.7^\circ$

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

RADIAANIT: RAD-tila

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

$\theta = 0.59$ rad

$\Rightarrow \quad 3.61 \angle 0.59$

KOTITEHT. 28, 29

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