21 October 2022

radians 360° degrees equals 2π radians

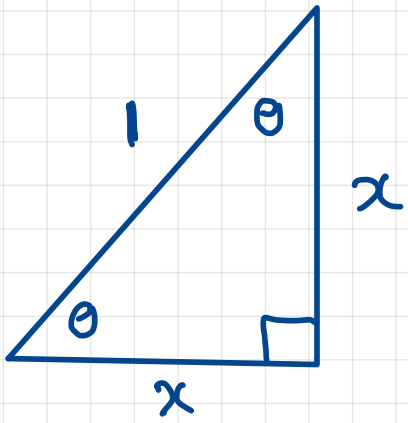
$180° = \pi$ radian

why? explained later

find some ratios without a calculator.

pragmatically for the exam.

$\theta = \frac{\pi}{4}$ (45°)



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

$1 = 2x^2$

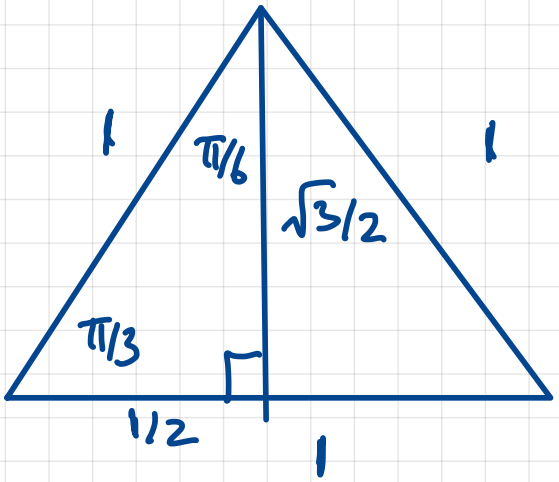
$x^2 = \frac{1}{2}$

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

$\sin \frac{\pi}{4} = \frac{1}{\sqrt{2}}$

$\cos \frac{\pi}{4} = \frac{1}{\sqrt{2}}$

$\tan \frac{\pi}{4} = 1$



find trig ratios using this triangle

$\cos\frac{\pi}{3} = \frac{1}{2}$

$\sin\frac{\pi}{3} = \frac{\sqrt{3}}{2}$

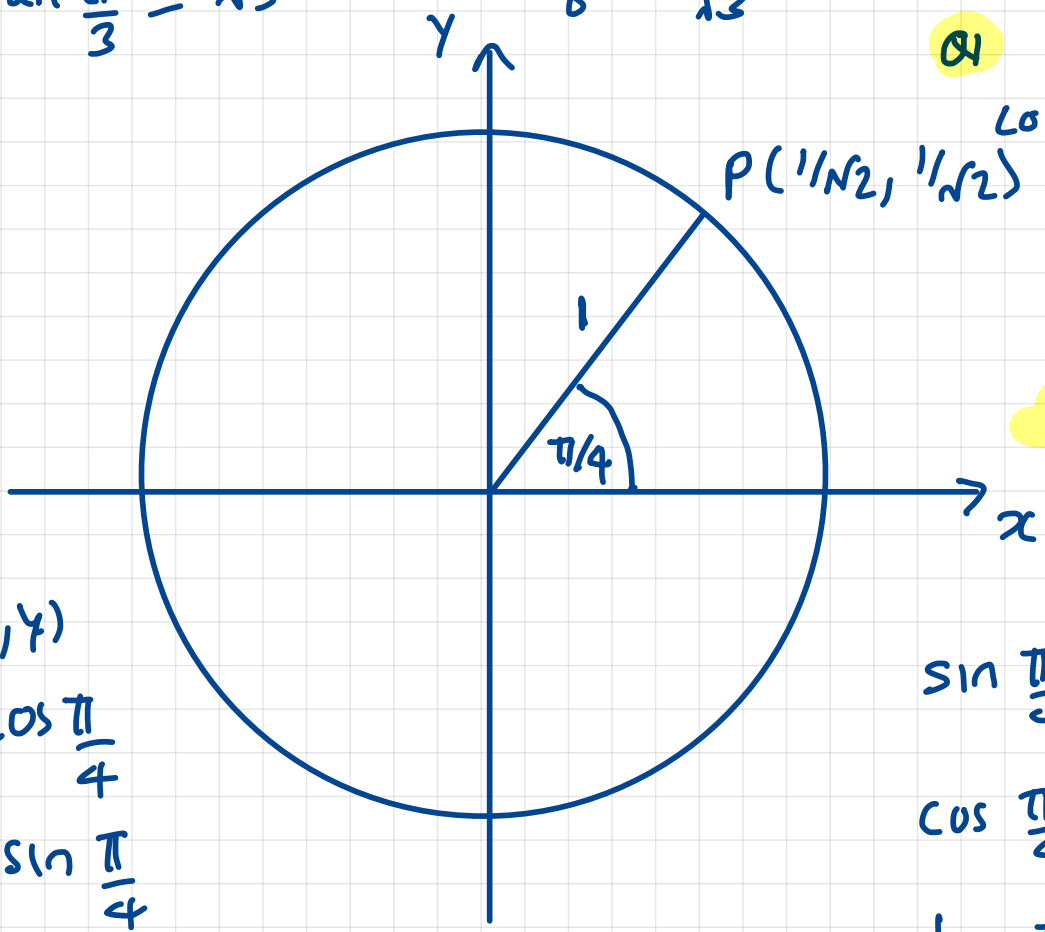
$\tan\frac{\pi}{3} = \sqrt{3}$

$\cos\frac{\pi}{6} = \frac{\sqrt{3}}{2}$

$\sin\frac{\pi}{6} = \frac{1}{2}$

$\tan\frac{\pi}{6} = \frac{1}{\sqrt{3}}$

Q1 Find the coordinate of P.



Unit circle

$P(x, y)$

$x = \cos\frac{\pi}{4}$

$y = \sin\frac{\pi}{4}$

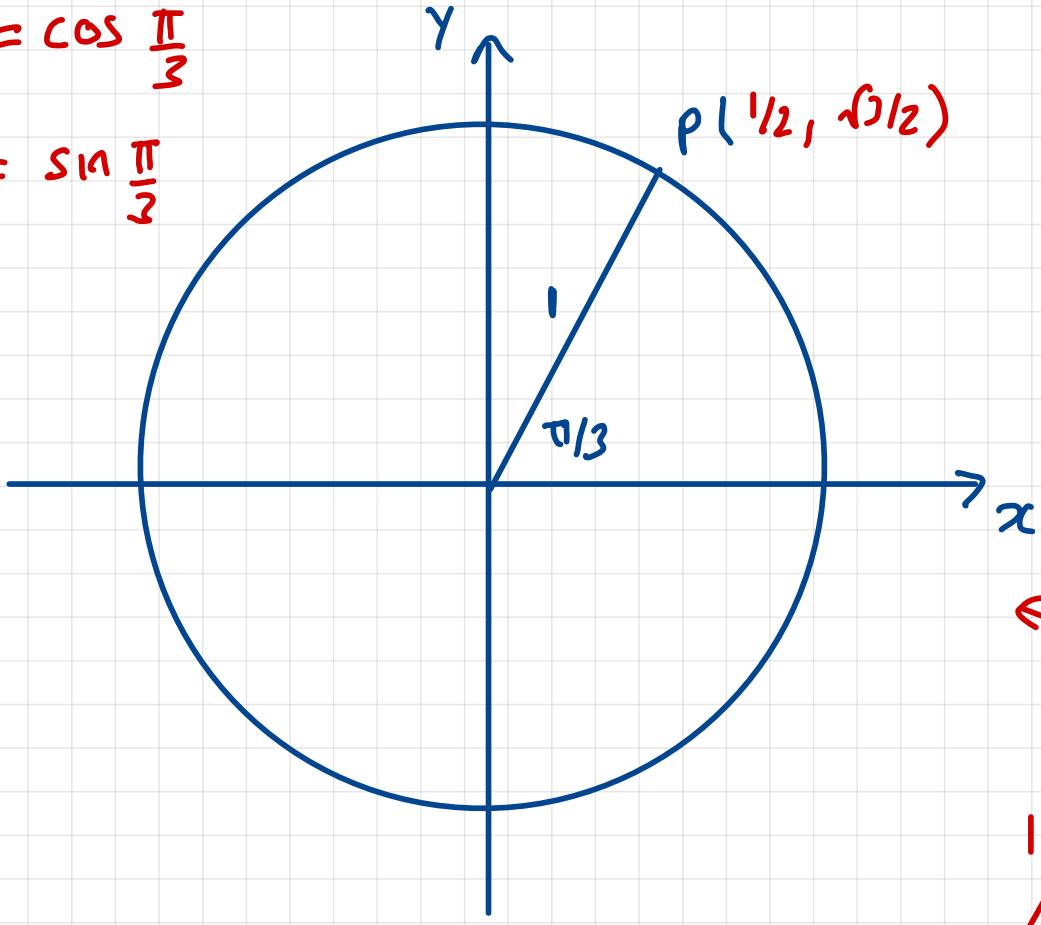
$\sin\frac{\pi}{4} = \frac{1}{\sqrt{2}}$

$\cos\frac{\pi}{4} = \frac{1}{\sqrt{2}}$

$\tan\frac{\pi}{4} = 1$

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

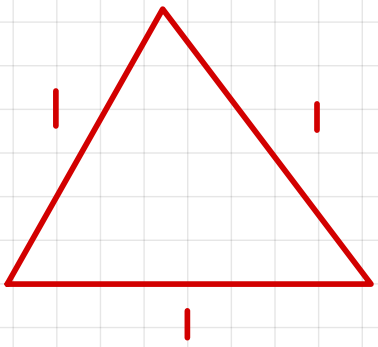
$y = \sin \frac{\pi}{3}$

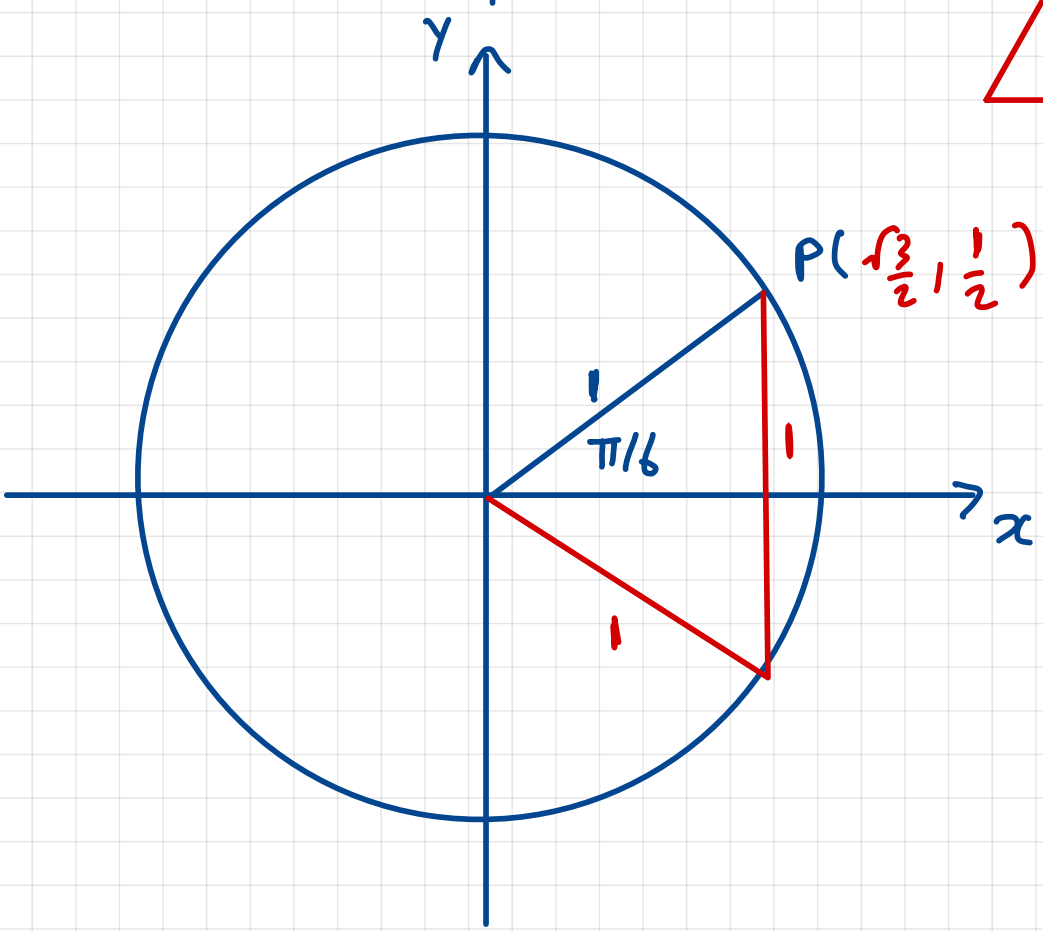


Q2

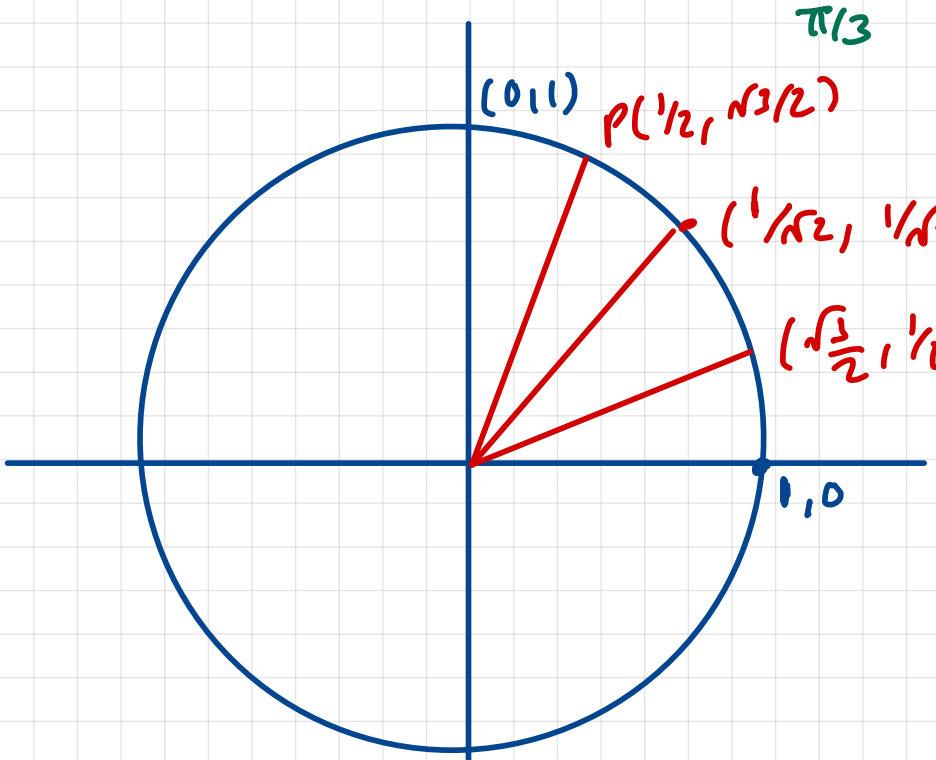
fill in the x and y coordinates of P

Using





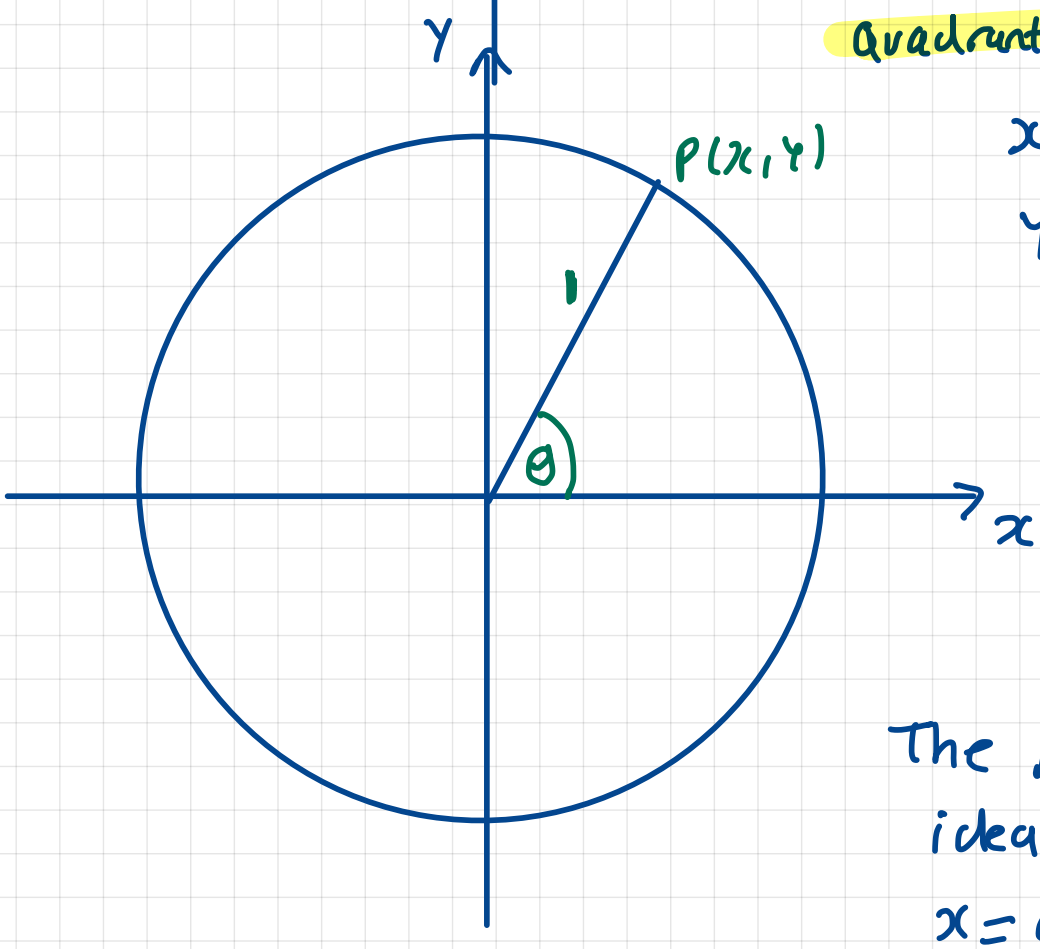
Quadrant 1



Quadrant 1

$x = \cos\theta$

$y = \sin\theta$

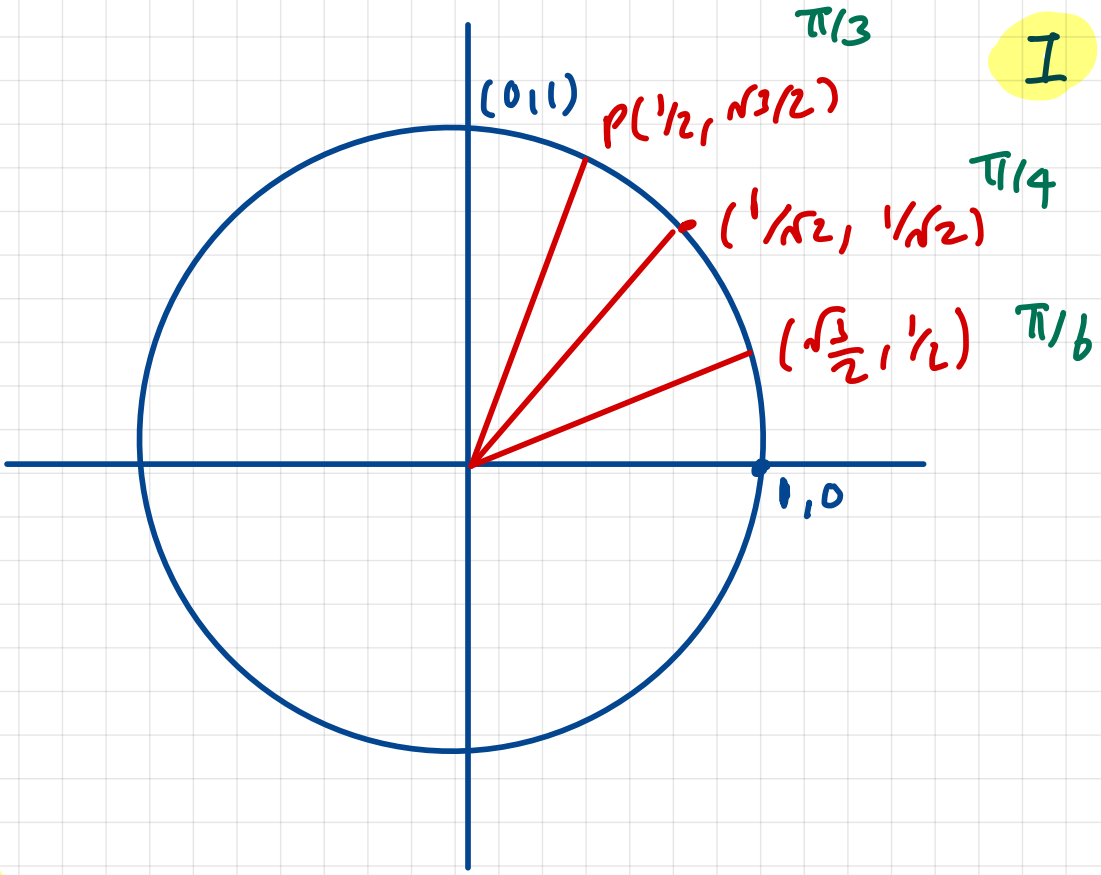


The fundamental idea

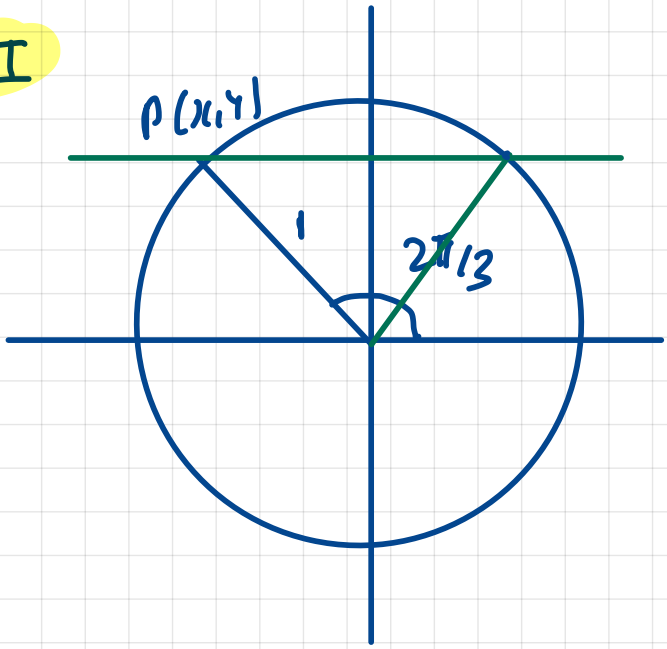
$x = \cos\theta$

$y = \sin\theta$

true for all angles



Q3 From the definition for all angles through the unit circle find $\cos\frac{2\pi}{3}$ and $\sin\frac{2\pi}{3}$



Find the coordinate of P

$P(-1/2, \sqrt{3}/2)$

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

$\sin\frac{2\pi}{3} = \frac{\sqrt{3}}{2}$

Check using the calculator

cos 120 =

sin 120 =

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

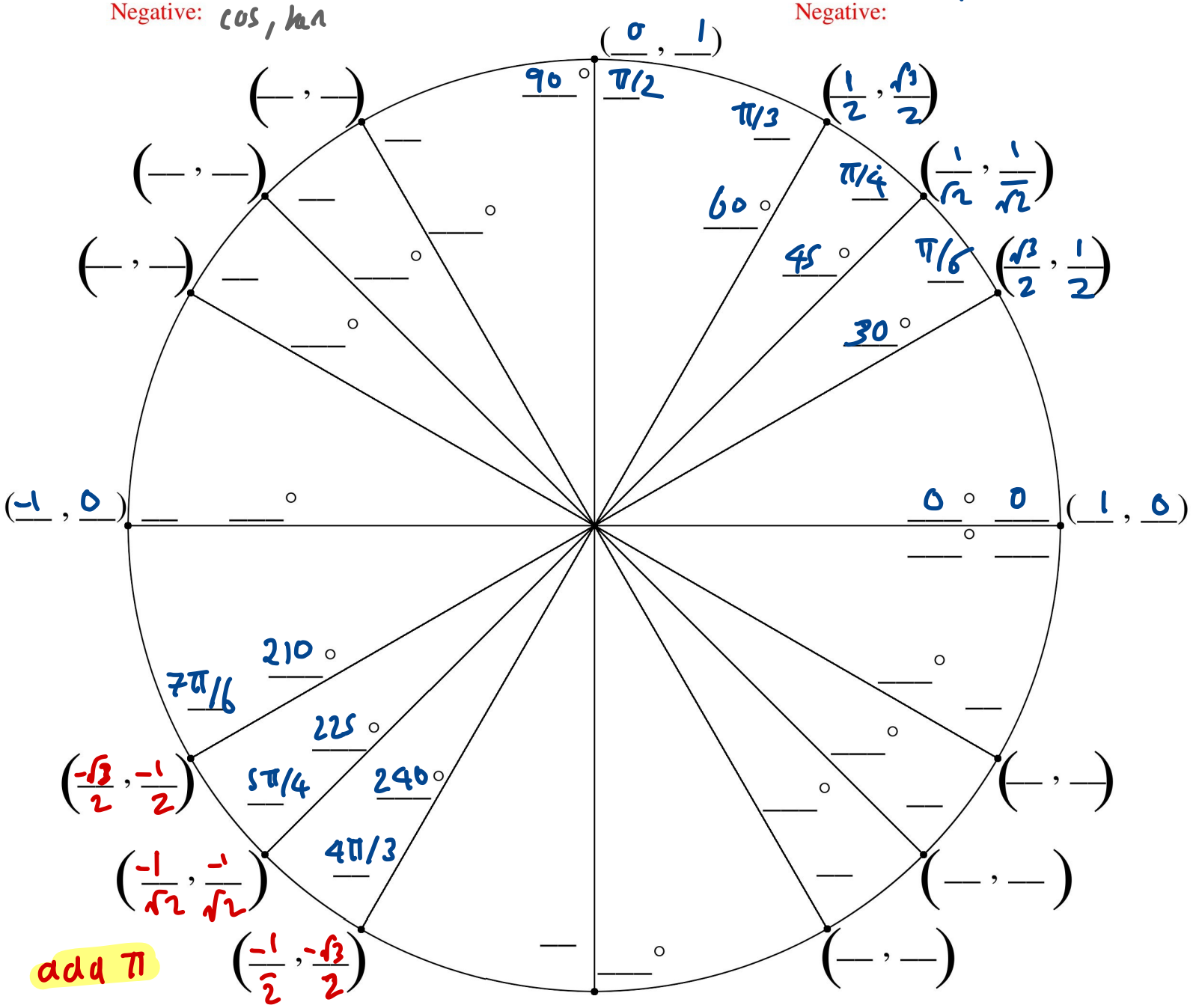
Fill in The Unit Circle

II

Positive: sin
Negative: cos, tan

I

Positive: cos, sin, tan
Negative:



add π

Positive: tan
Negative: cos, sin

III

Positive: cos
Negative: sin tan

IV

EmbeddedMath.com

Unit circle

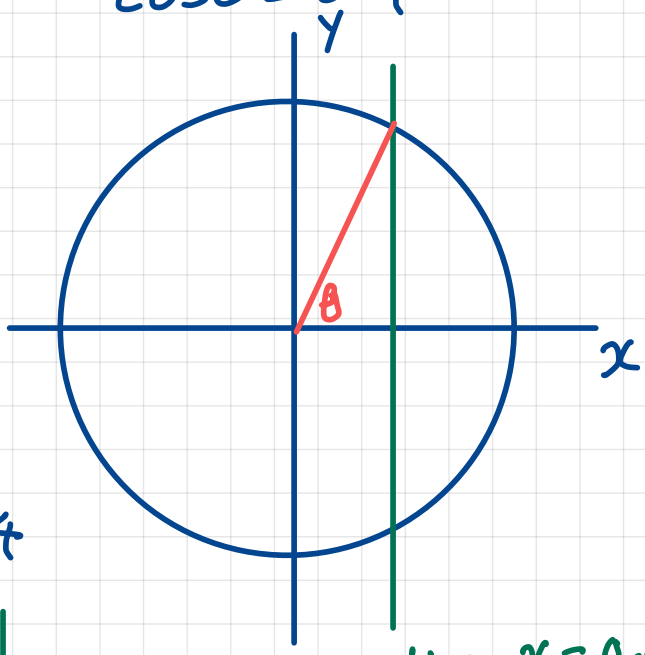
$x^2 + y^2 = 1$ $\quad y = \pm\sqrt{1-x^2}$

Use the unit circle to find cosθ, sinθ, tanθ for special angles (without a calculator)

Example

for $0 \leq \theta \leq 360$ solve

$\cos\theta = 0.4$



line $x = 0.4$

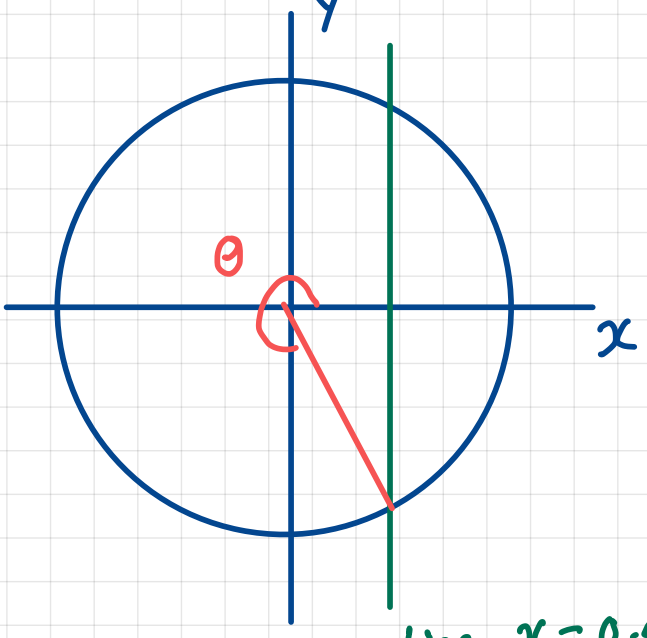
find θ when x coordinate of P is 0.4

use calculator

$\theta = \cos^{-1}(0.4)$

$\theta = 66.4$

$\cos\theta = 0.4$



line $x = 0.4$

$\theta = 360 - 66.4$

$\theta = 293.6$

$\cos(66.4)$ $\cos(293.6)$

≈ 0.4

Q4 Solve me following

(i) $\cos\theta = -1/2$ (calculator free)

(ii) $\cos\theta = -0.52$ (with calculator)

(iii) $\sin\theta = 0.1$ (with calculator)

(iv) $\sin\theta = -0.3$ (with calculator)

(iv) $\tan\theta = 1$ (calculator free)

(v) $\tan\theta = -1.1$ (with calculator)