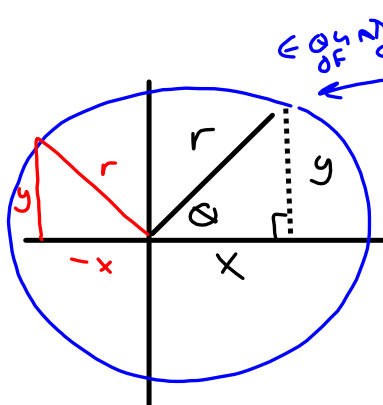# 5.4 Principal Angles

Apr 30

← EQUATION OF CIRCLE

$$x^2 + y^2 = r^2$$
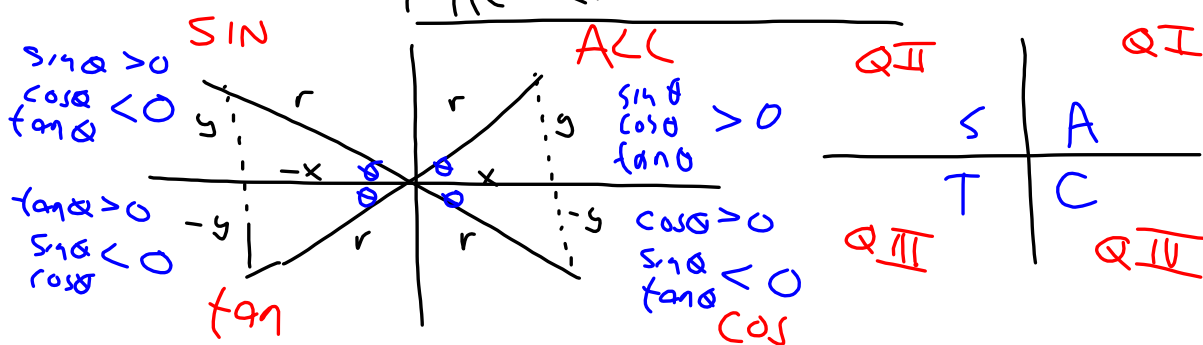
$$\sin\alpha = \frac{y}{r}$$

$$\cos\theta = \frac{x}{r}$$
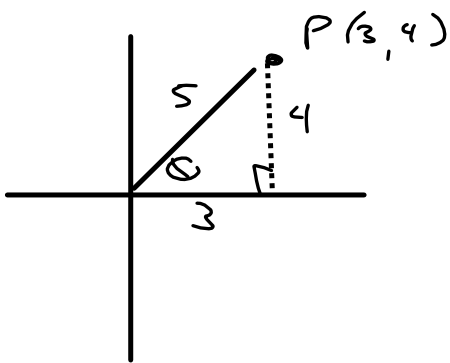
$$\tan\alpha = \frac{y}{x}$$

S  y r
C  x r
t  y x

## THE CAST RULE

SIN

$\sin\alpha > 0$
$\cos\alpha < 0$
$\tan\alpha$

ALL

$\begin{matrix}\sin\theta\\ \cos\theta\\ \tan\theta\end{matrix} > 0$

$\tan\alpha > 0$
$\sin\alpha < 0$
$\cos\theta$

$\cos\theta > 0$
$\sin\alpha < 0$
$\tan\alpha$

tan

COS

QII      QI

| S | A |
|---|---|
| T | C |

QIII      QIV

Ex) GIVEN $P(3,4)$ FIND ALL 6 TRIG RATIOS
AND THE PRINCIPAL ANGLE.

$P(3,4)$

$\sin\theta = \frac{4}{5} \longrightarrow \theta = \sin^{-1}\left(\frac{4}{5}\right)$
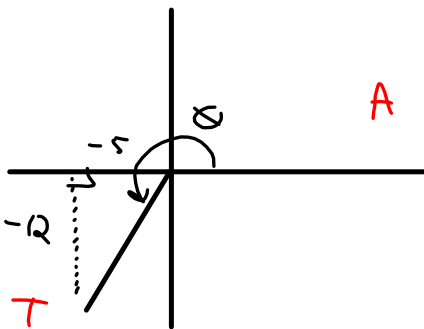
$\cos\theta = \frac{3}{5}$　　　　$\theta \doteq 53°$

$\tan\theta = \frac{4}{3}$

$\csc\theta = \frac{5}{4}$

$\sec\theta = \frac{5}{3}$

$\cot\theta = \frac{3}{4}$

Ex) FIND PRINCIPAL ANGLE FOR $P(-5; 12)$

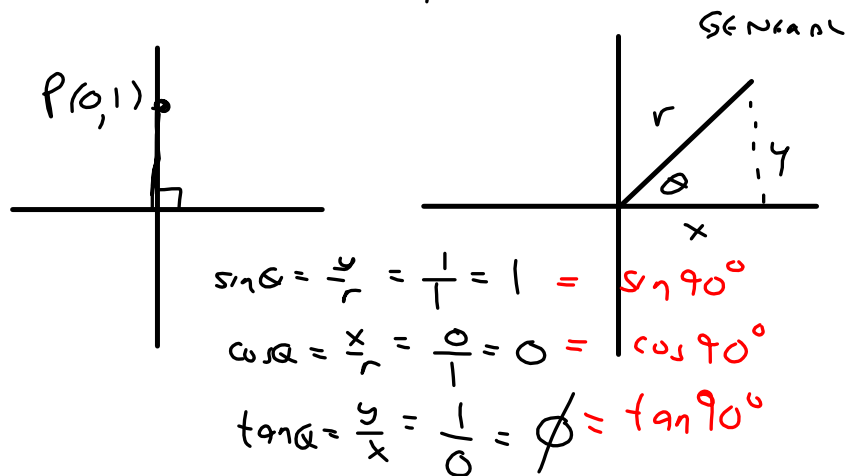$\tan\theta = \frac{-12}{-5} = \frac{12}{5}$

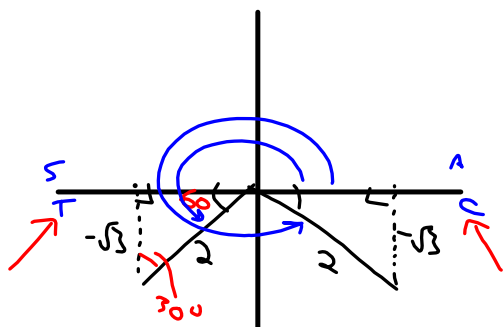$\theta = \tan^{-1}\left(\frac{12}{5}\right) \doteq 67°, 180+67°$

$\therefore \theta \doteq 247°.$

A

T

2

Ex) USE $P(0,1)$ TO FIND sin, cos, tan of $90°$

GENERAL



$\sin\theta = \dfrac{y}{r} = \dfrac{1}{1} = 1 = \sin 90°$

$\cos\theta = \dfrac{x}{r} = \dfrac{0}{1} = 0 = \cos 90°$

$\tan\theta = \dfrac{y}{x} = \dfrac{1}{0} = \emptyset = \tan 90°$

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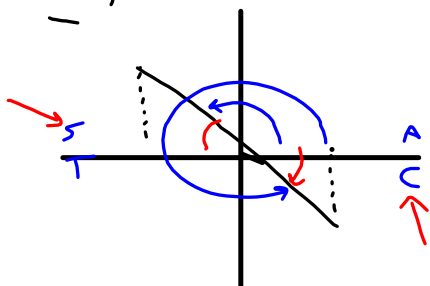Ex) FIND PRINCIPAL ANGLE, $\csc\theta = -\dfrac{2\sqrt{3}}{3}$, $0° \le \theta \le 360°$



$\csc\theta = -\dfrac{2\sqrt{3}}{3} \cdot \dfrac{\sqrt{3}}{\sqrt{3}}$

$= -\dfrac{2(3)}{3\sqrt{3}} = -\dfrac{2}{\sqrt{3}}$

$\sin\theta = -\dfrac{\sqrt{3}}{2}$

$\therefore \theta = 240°, 300°$

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Ex) FIND PRINCIPAL ANGLE $\tan\theta = -2.4$, $0° \le \theta \le 360°$



$\theta = \tan^{-1}(-2.4) = -67°$

$\theta = 180 - 67, \quad 360 - 67$

$\therefore \underline{\theta \doteq 113°, \quad 293°}$

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Homework p. 299#2cd,4,6abd,8ace,12