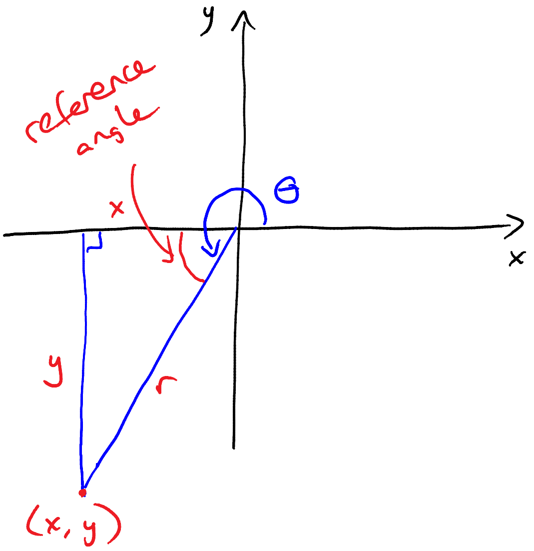
Section 6.3: cont'd

Tuesday, January 13, 2015
11:27 AM

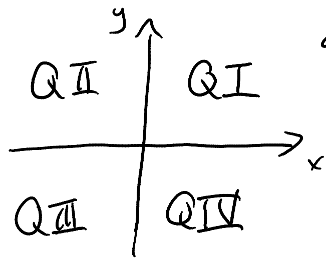
general case: trig functions of θ



reference angle - positive angle that the terminal arm makes with the nearest x-axis

r - hypotenuse
always positive
represents distance from origin to vertex of triangle

notation:



quadrant 1

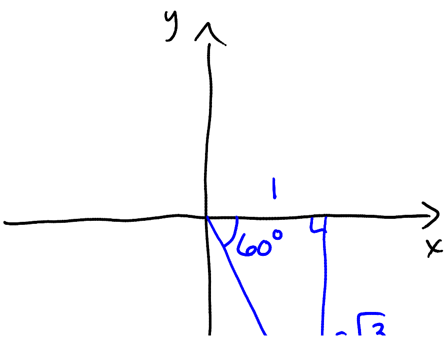
redefine trig functions in terms of x, y, r:

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

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

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

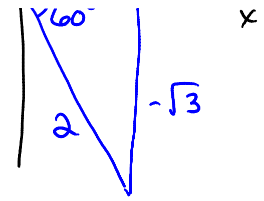
example: calculate the values of the six trig functions of 300°, giving exact answers



$$\sin 300° = \frac{y}{r} = \frac{-\sqrt{3}}{2}$$

$$\cos 300° = \frac{x}{r} = \frac{1}{2}$$

$$\tan 300° = \frac{y}{} = -\sqrt{3}$$



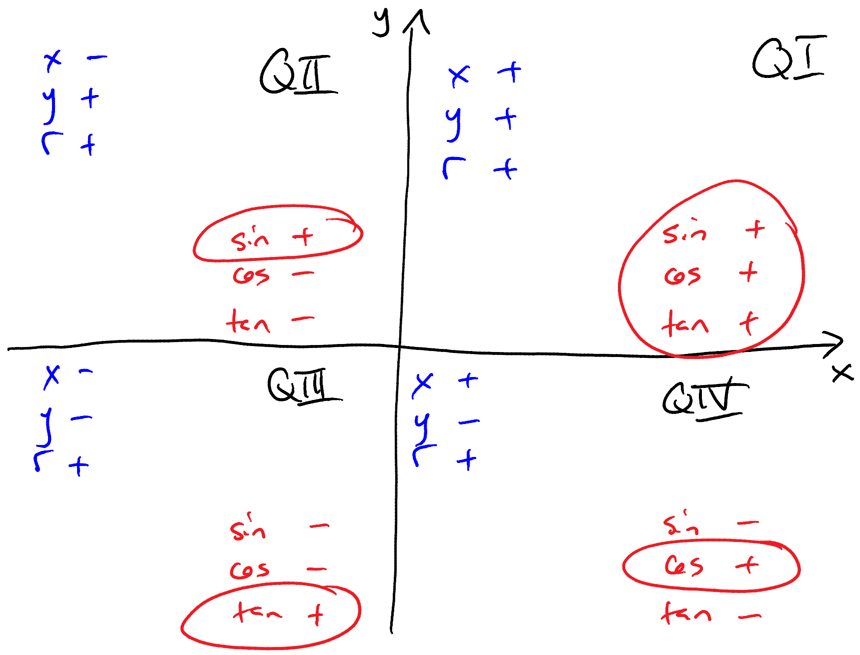
$\tan 300° = \frac{y}{x} = -\sqrt{3}$

$\csc 300° = \frac{2}{-\sqrt{3}} = \frac{-2\sqrt{3}}{3}$

$\sec 300° = 2$

$\cot 300° = \frac{-\sqrt{3}}{3}$

is there a quick way to determine the +/− for each trig function?



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

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

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

ASTC ⟸ indicates which trig functions are positive in each quadrant

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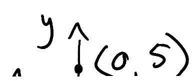
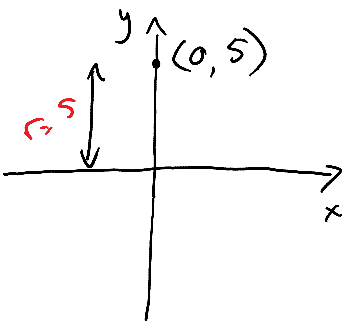
quadrantal angles - angles whose terminal arm lies on one of the axes

example: Calculate the values of the six trig functions of 90°.



$\sin 90° = \frac{y}{r} = \frac{5}{5} = 1$



$\sin 90^\circ = \frac{y}{r} = \frac{5}{5} = 1$

$\cos 90^\circ = \frac{x}{r} = \frac{0}{5} = 0$

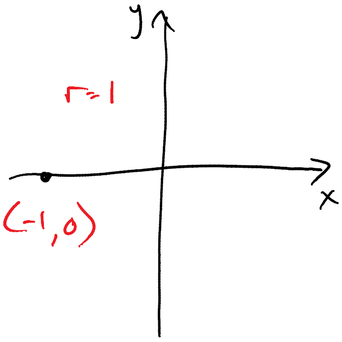
$\tan 90^\circ = \frac{y}{x} = \frac{5}{0} =$ undefined

$\csc 90^\circ = 1$

$\sec 90^\circ =$ undefined

$\cot 90^\circ = \frac{0}{5} = 0$

calculate the values of the six trig functions of 180°.



$\sin 180^\circ = \frac{y}{r} = 0$

$\cos 180^\circ = \frac{x}{r} = -1$

$\tan 180^\circ = \frac{y}{x} = 0$

$\csc 180^\circ =$ undefined (or DNE)

$\sec 180^\circ = -1$

$\cot 180^\circ =$ undefined

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if $\sin\theta$ is positive and $\tan\theta$ is negative, in which quadrant is θ?

$\sin\theta$ + $\leftarrow$ QI or QII

$\tan\theta$ − $\leftarrow$ QII or QIV

$\therefore$ θ is in QII