

## SM3 HANDOUT 6-2 (Exact Trig. Ratios)

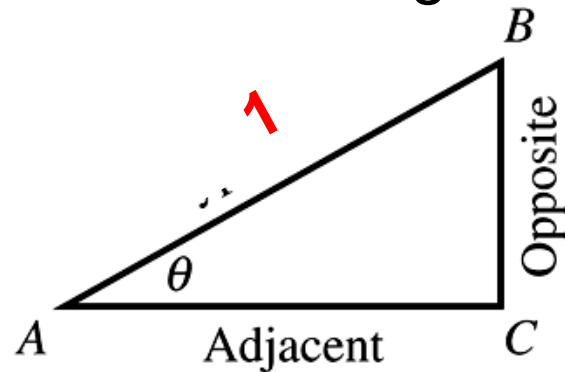
$$\underline{\text{hypotenuse} = 1}$$

Why is it “nice” to have a hypotenuse whose length is ‘1’?

$$\text{Sin } \theta = \underline{\text{opposite side}}$$

$$\text{Cos } \theta = \underline{\text{adjacent side}}$$

$$\text{Tan } \theta = \underline{\text{opp/adj}}$$



The length of the hypotenuse is \_\_\_\_\_

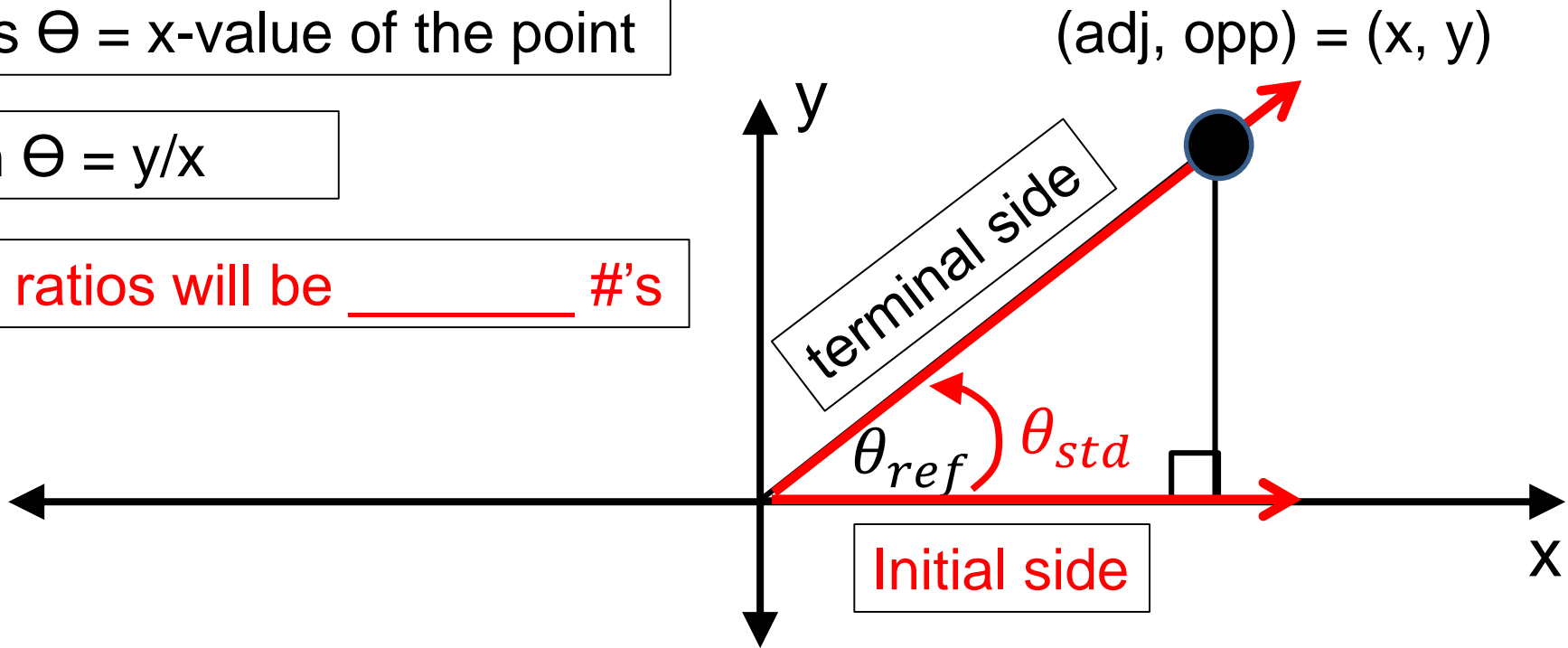
For Quadrant I  $\theta_{ref} = \theta_{std}$

Sin  $\Theta$  = y-value of the point

Cos  $\Theta$  = x-value of the point

Tan  $\Theta$  =  $y/x$

Trig ratios will be \_\_\_\_\_ #'s



Reference angle: The acute angle with the x-axis.

For Quadrant II  $\theta_{ref} = 180 - \theta_{std}$

Sine ratio is a \_\_\_\_\_ number

Cosine ratio is a \_\_\_\_\_ number

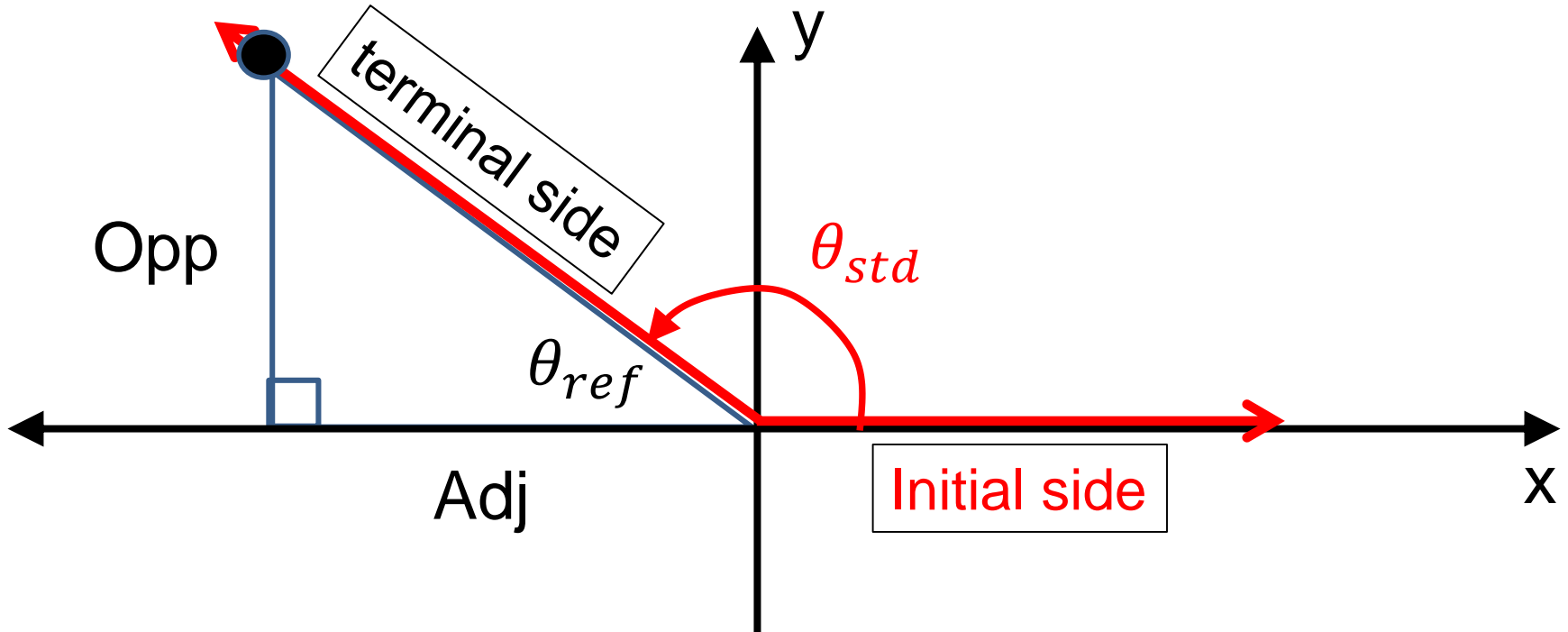
Tangent ratio is a \_\_\_\_\_ number

$$\sin \theta = y$$

$$\cos \theta = x$$

$$\tan \theta = y/x$$

(adj, opp) = (x, y)



For Quadrant III

$$\theta_{ref} = \theta_{std} - 180$$

$$\sin \theta = y$$

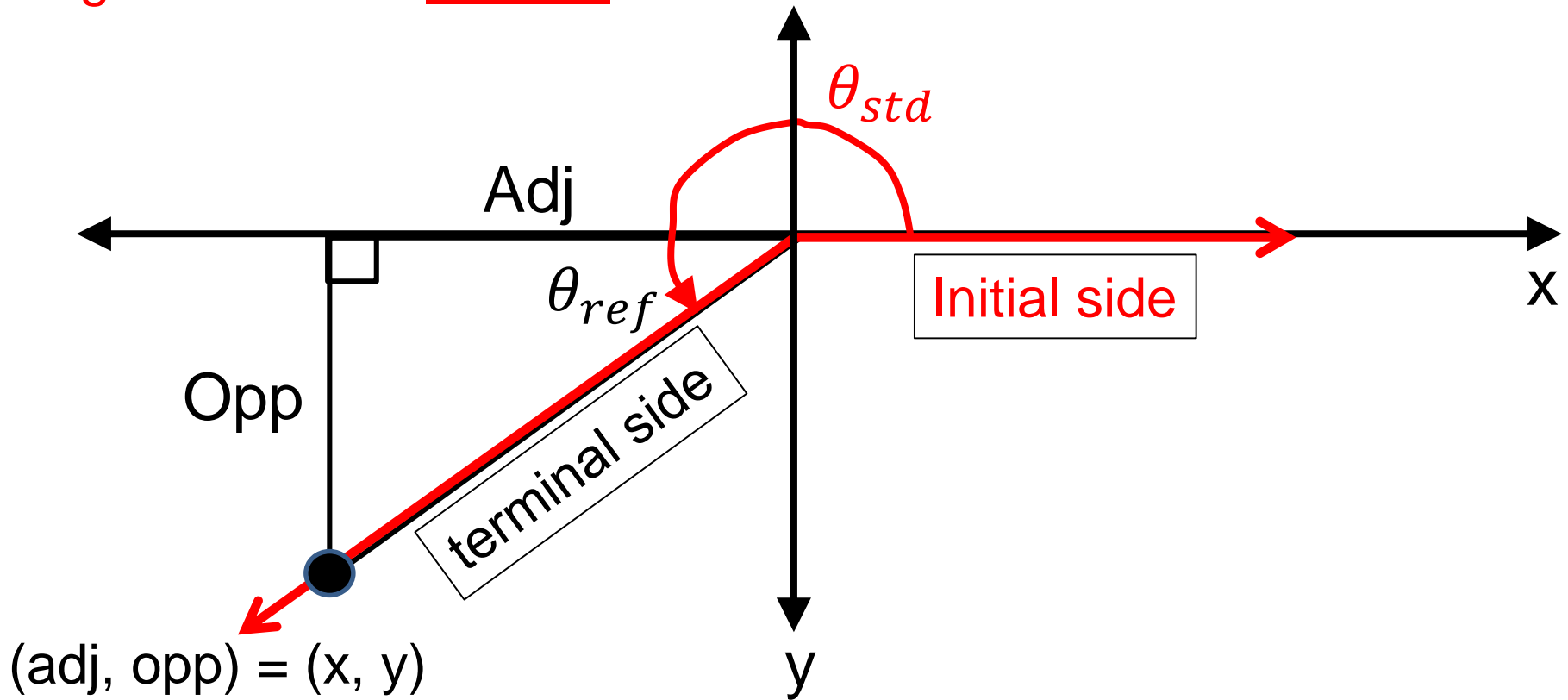
$$\cos \theta = x$$

$$\tan \theta = y/x$$

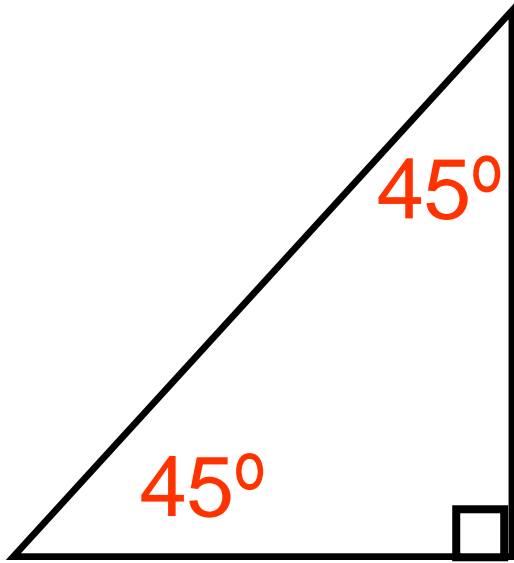
Sine ratio is a \_\_\_\_\_ number

Cosine ratio is a \_\_\_\_\_ number

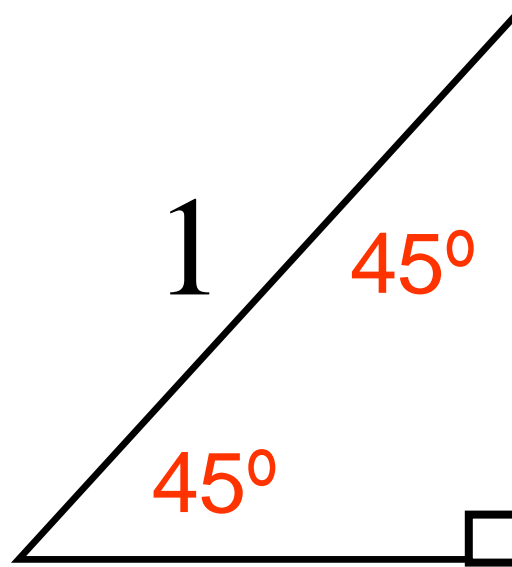
Tangent ratio is a \_\_\_\_\_ number



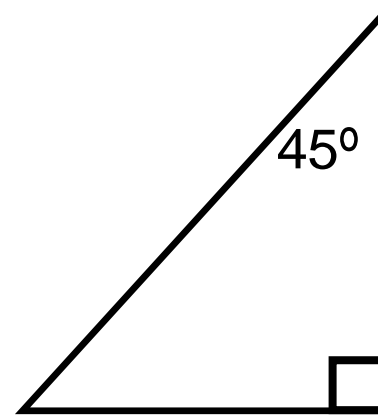
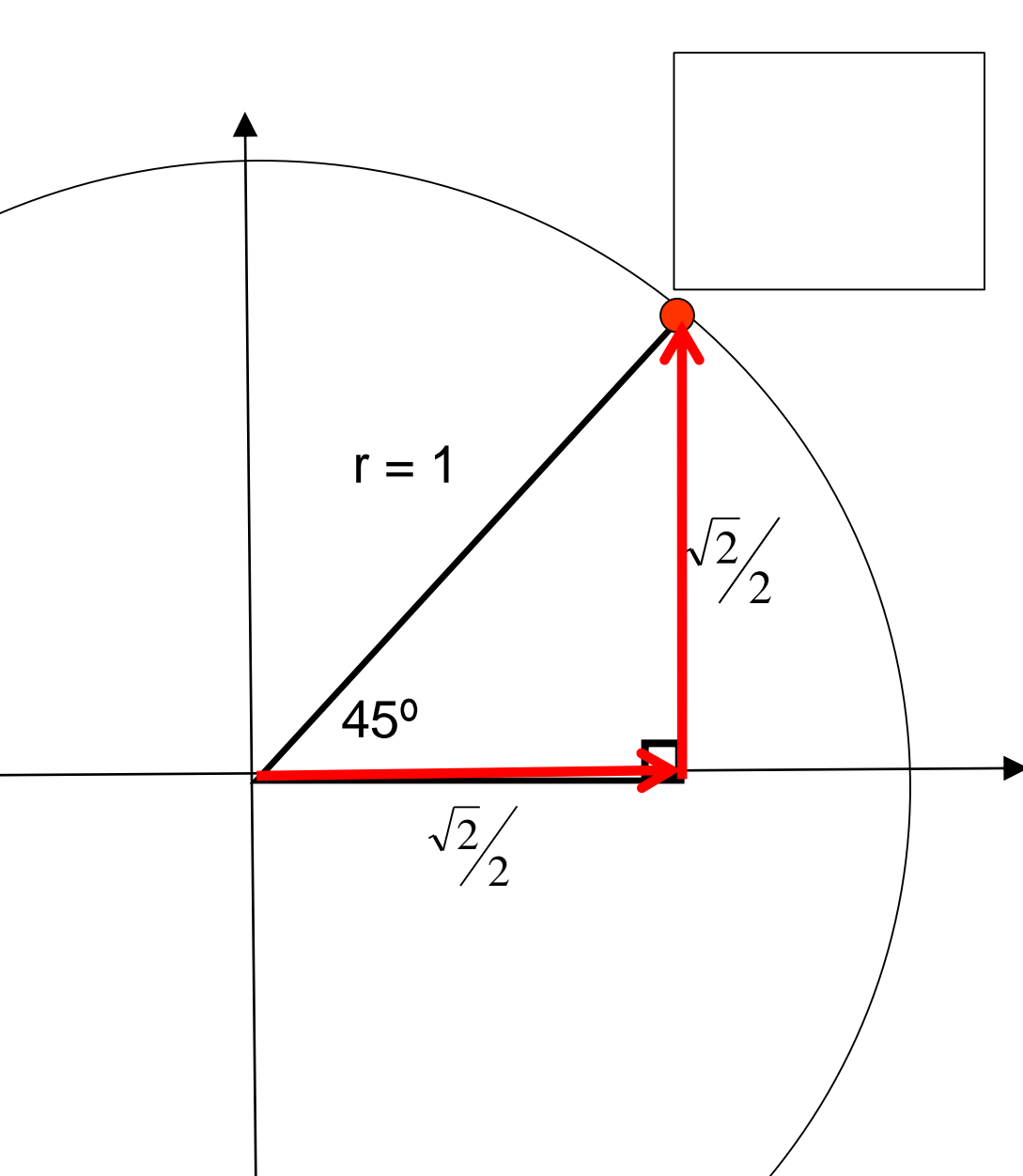
Do you remember the side lengths for a 45-45-90 triangle?



What are the leg lengths if the hypotenuse = 1?



Let's put the triangle on top of a circle with radius = 1.

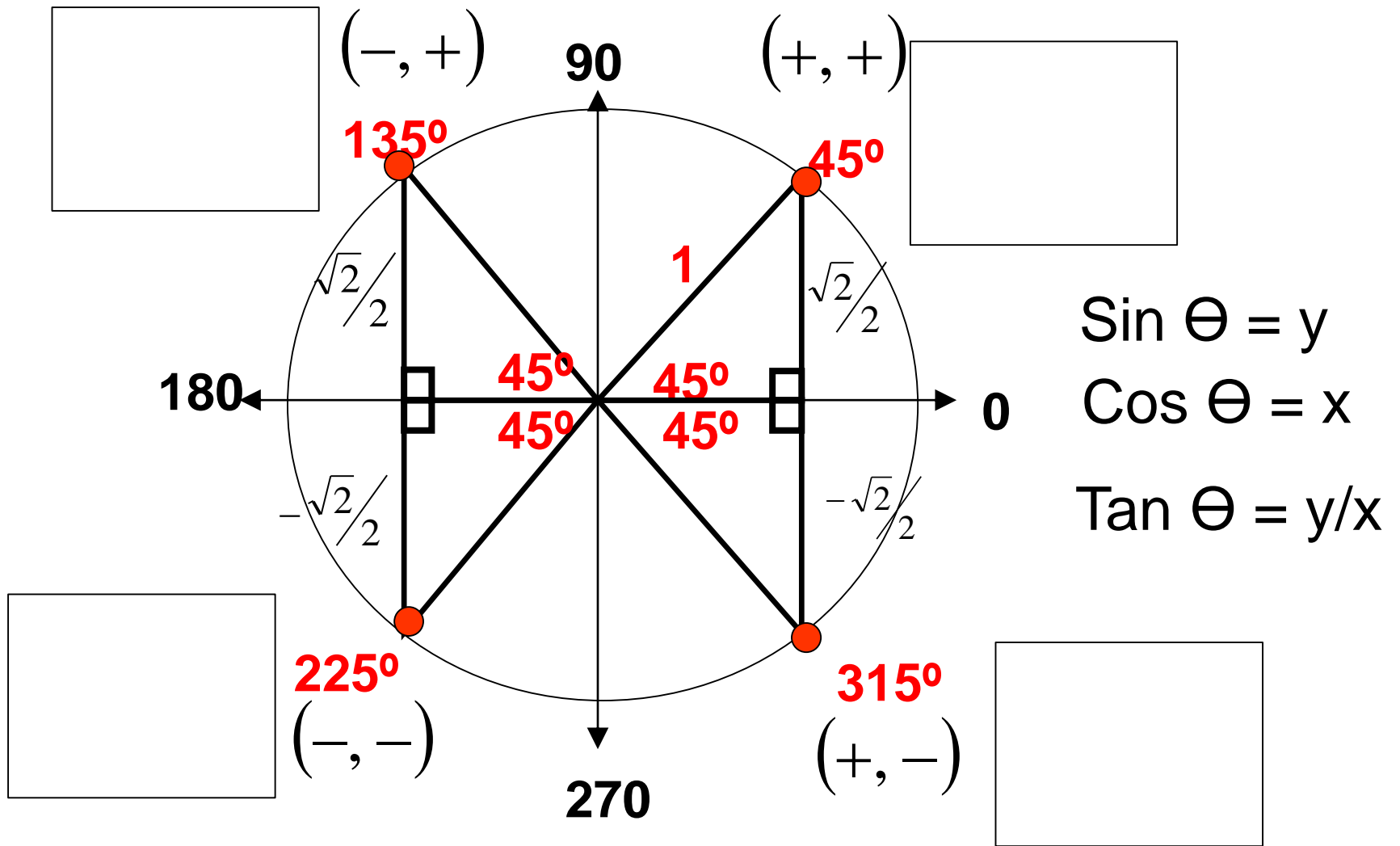


$$\sin \theta = y$$

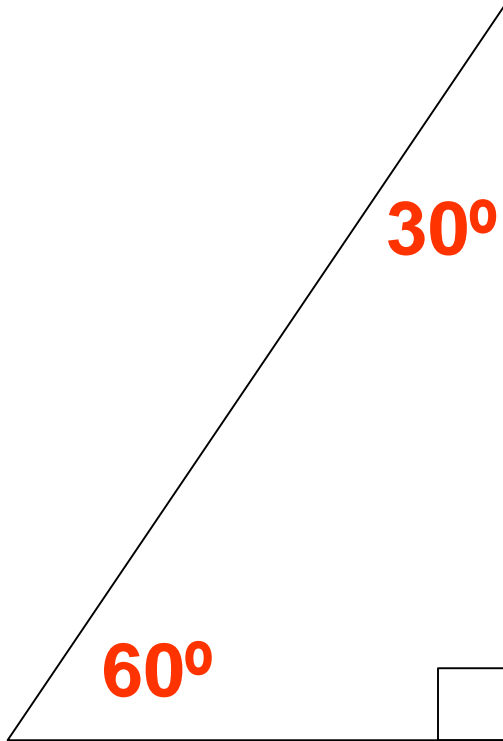
$$\cos \theta = x$$

$$\tan \theta = y/x$$

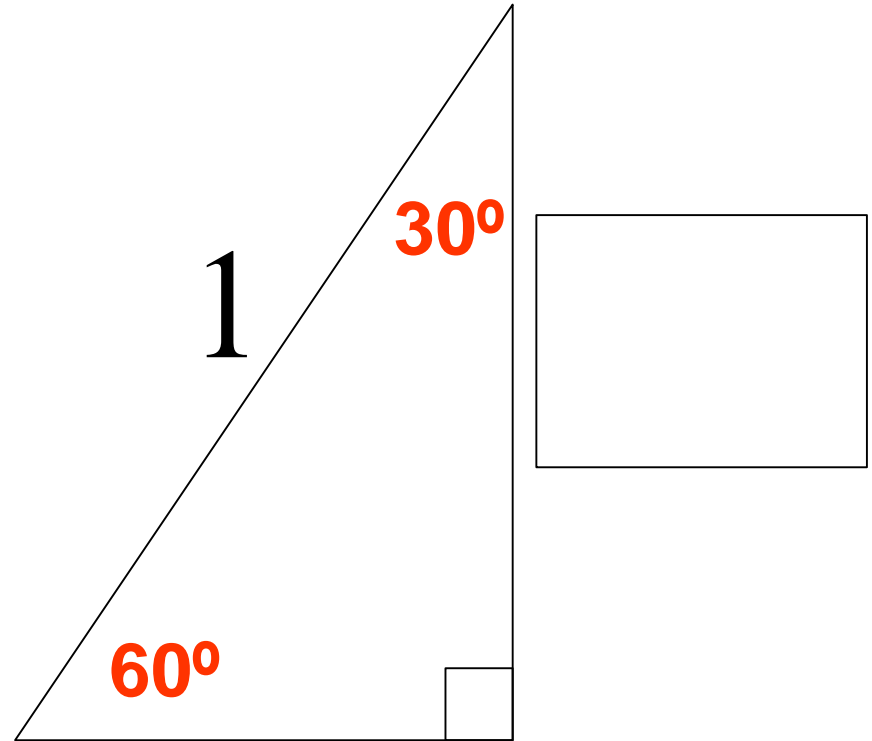
We can use a 45° reference angle 4 times



Do you remember the side lengths for the 30-60-90 triangle?

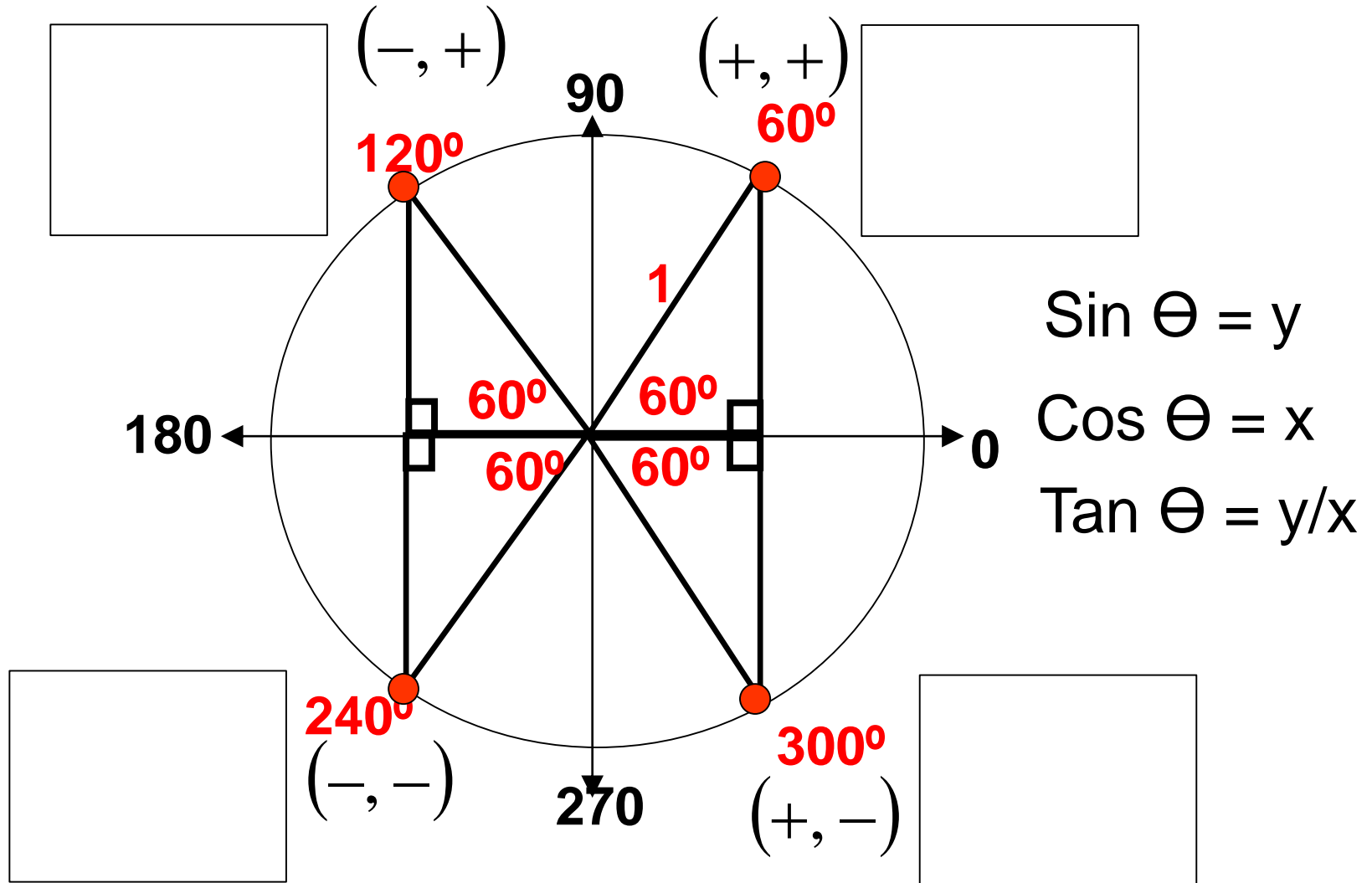


What are the leg lengths if the hypotenuse = 1?

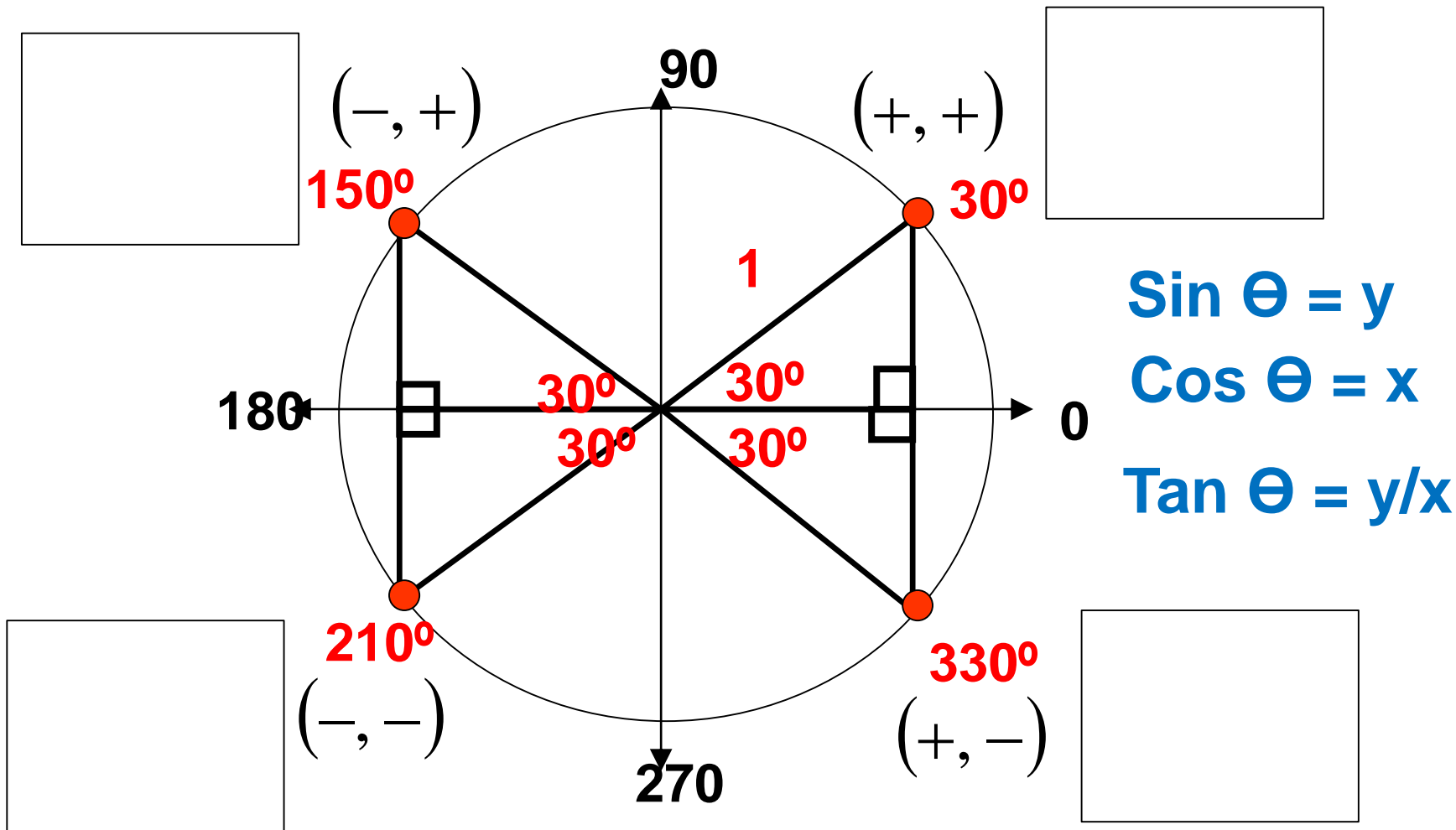




We can use a  $60^\circ$  reference angle 4 times



We can use a 30° reference angle 4 times



We know the exact ratios for the following angles.

Angle	Sine	Cosine	Tangent
30			
150			
210			
330			

Reference Angle:  $30^\circ$

We know the exact ratios for the following angles.

Angle	Sine	Cosine	Tangent
45			
135			
225			
315			

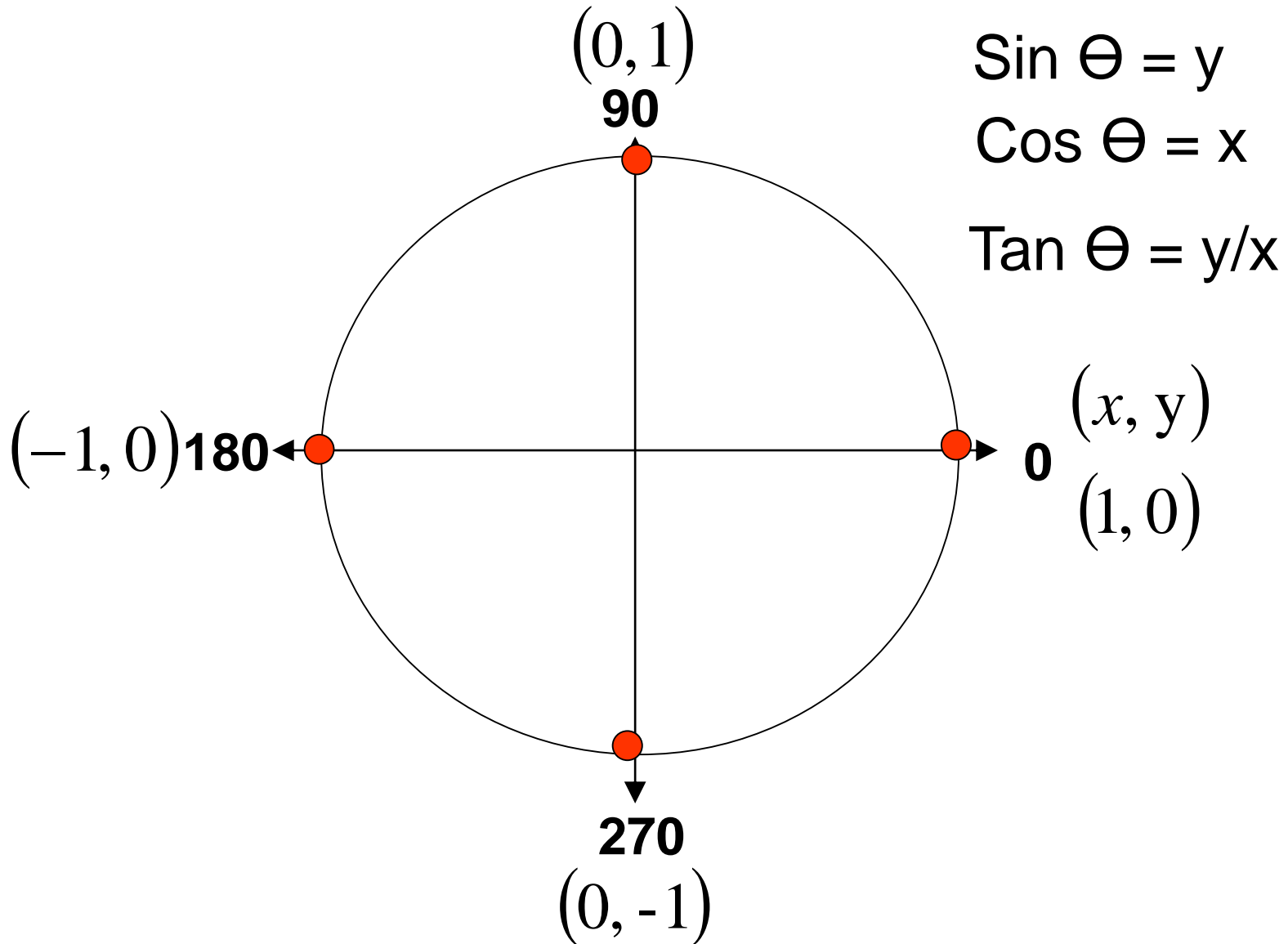
Reference Angle:  $45^\circ$

We know the exact ratios for the following angles.

Angle	Sine	Cosine	Tangent
60			
120			
240			
300			

Reference Angle:  $60^\circ$

What about the “cardinal angles”?



We know the exact ratios for the following angles.

Angle	Sine	Cosine	Tangent
0			
90			
180			
270			

$$\tan 0^\circ = \frac{y}{x} = \frac{0}{1} = 0$$

$$\tan 90^\circ = \frac{y}{x} = \frac{1}{0} = \textit{undefined}$$

The tangent function does **NOT** have a domain of “all real numbers”.