

RECALL: ① the domain of a function

ARE THE VALUES of the first number in the set of ordered pairs. In other words, the "X" in  $(X, Y)$ .

② in some functions "X" is any real number, in other functions, "X" may be restricted in some way.

①  $y = f(x) = 2x + 3$       domain = ?

②  $y = f(x) = \sqrt{x}$       domain = ?

③  $y = f(x) = \frac{1}{x-2}$       domain = ?

④  $y = f(\theta) = \sin(\theta)$       domain = ? TIP: LOOK AT TRIG. TABLE

↓  
 $\{\theta \text{ in degrees}\}$

SEE THE problem? We only know  $\sin(\theta)$  for  $0 \leq \theta \leq 90$  degrees.

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We want to define  $y = \sin(\theta)$  for ANY  $\theta$

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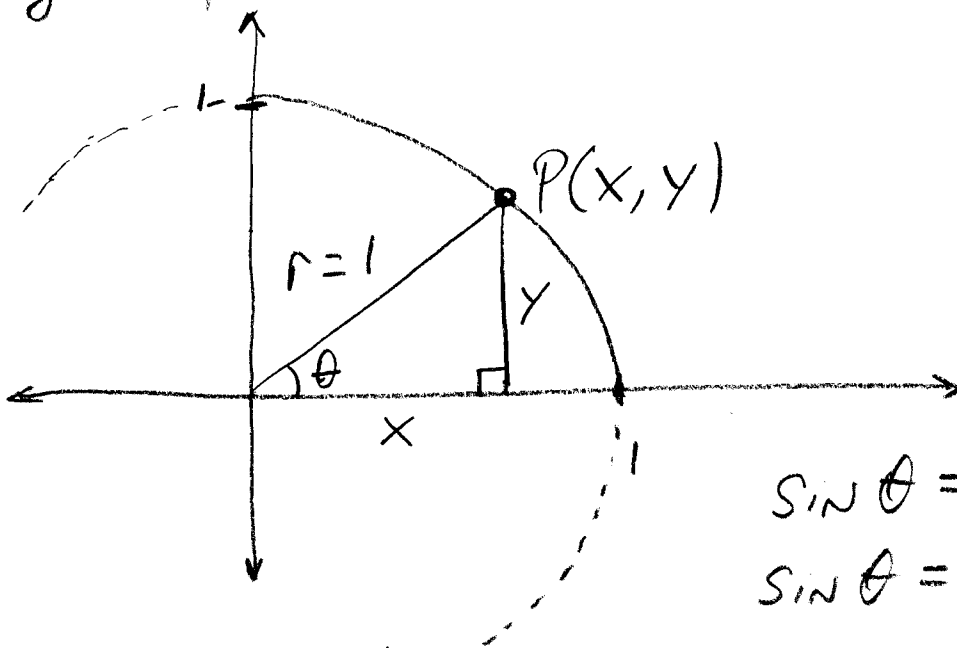
THE "UNIT CIRCLE" - A powerful tool.

↓  
unity = 1

∴ UNIT CIRCLE = circle with a radius of 1

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Why so powerful?



$$\sin \theta = ?$$

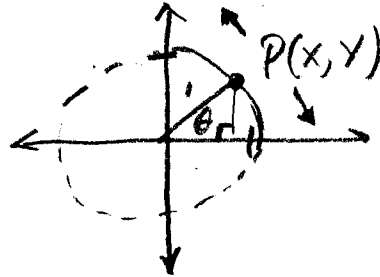
$$\sin \theta = \frac{y}{1} = y$$

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

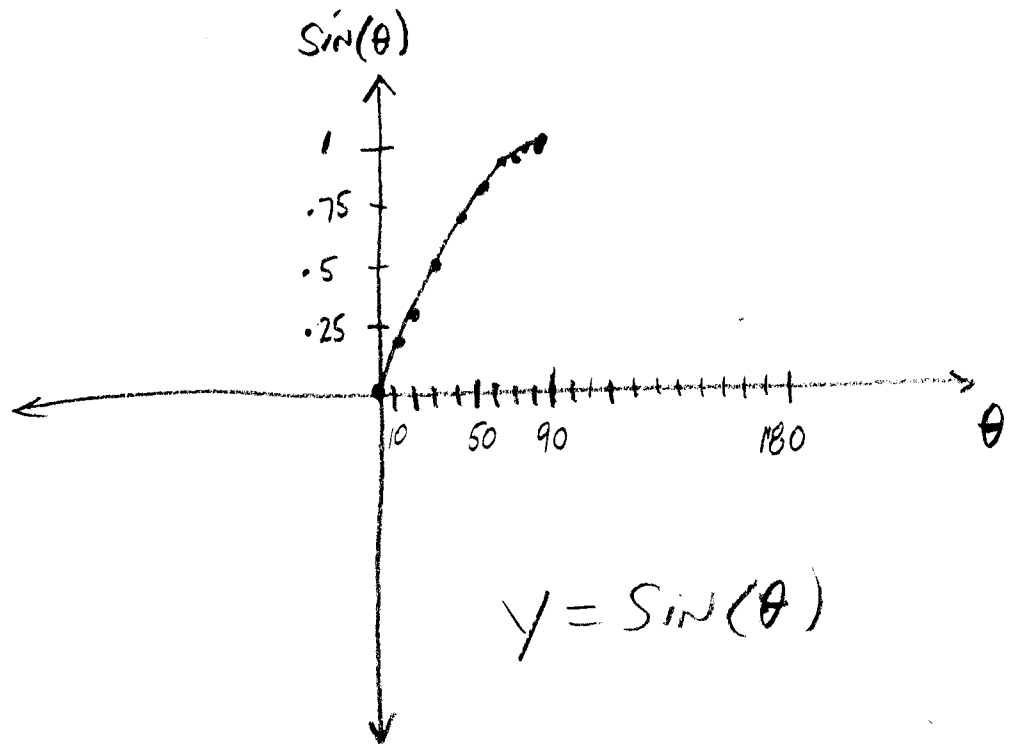
Lets graph  $y = \sin(\theta)$  in QUADRANT I

How?

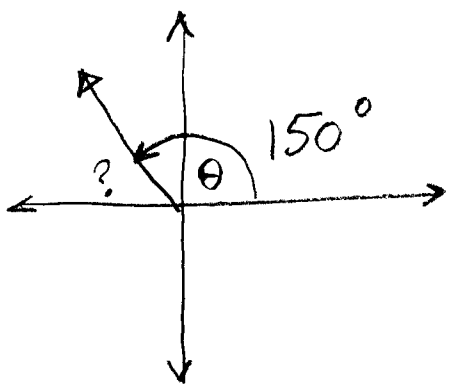
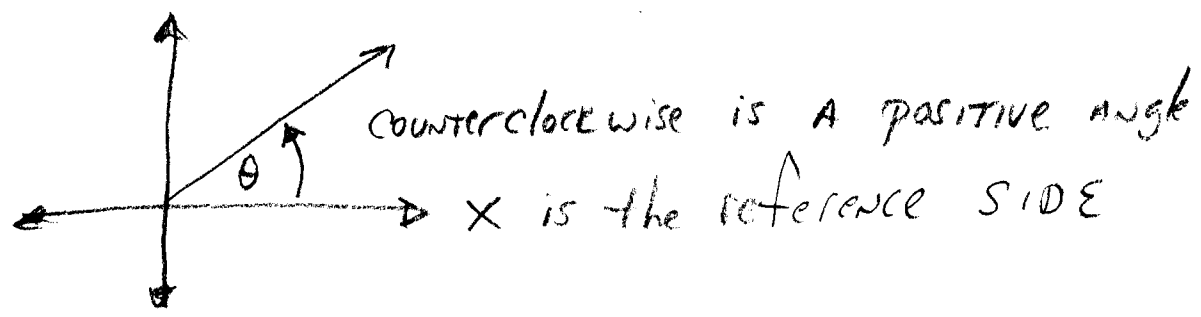
$\theta$	$y = \sin(\theta)$
0	0
10	.2
20	.3
30	.5
40	.7
50	.8
60	.9
70	.9
80	1.0
90	1.0



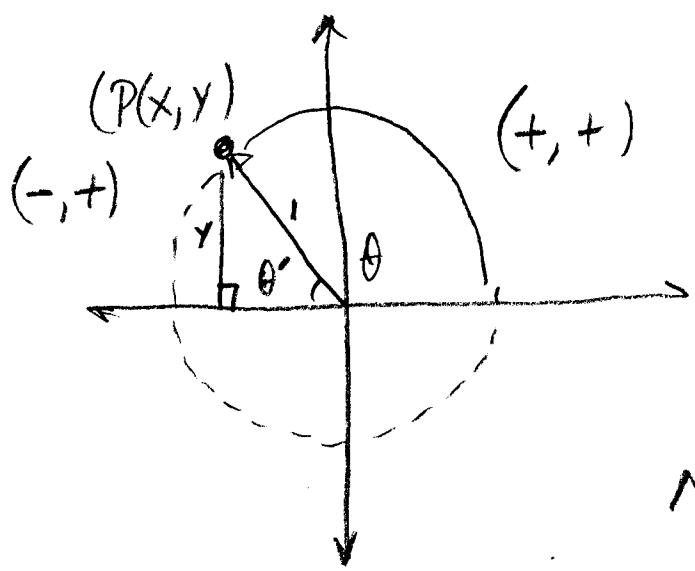
How does  $y$  change as  $P$  goes from 0 to 1?



To get values for  $y = \sin(\theta)$  for  $\theta$  that is  $> 90^\circ$ , we need to agree on a way to measure angles.



? = reference angle  
 $\theta' = \text{reference angle} = 30^\circ$



USING THE UNIT CIRCLE  
WHERE  $y = \sin(\theta)$

$$y = \sin(\theta) = \sin(\theta')$$

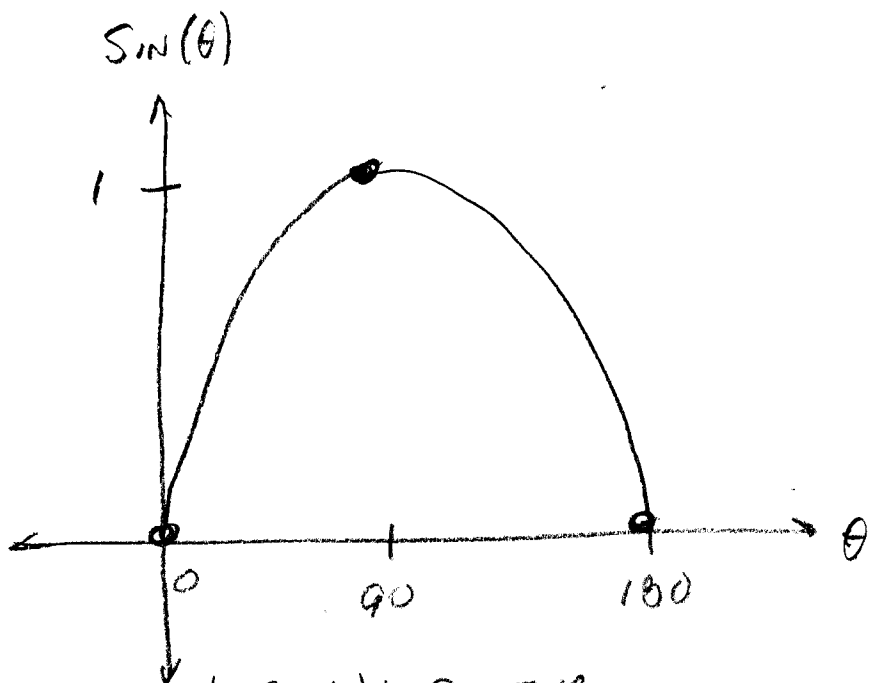
$$\therefore \sin(150^\circ) = \sin(30^\circ)$$

NOTE: y is + in QUADRANT II

WHAT DOES THE GRAPH OF  $y = \sin(\theta)$  look like for  $90 < \theta \leq 180$  ?

Recall:

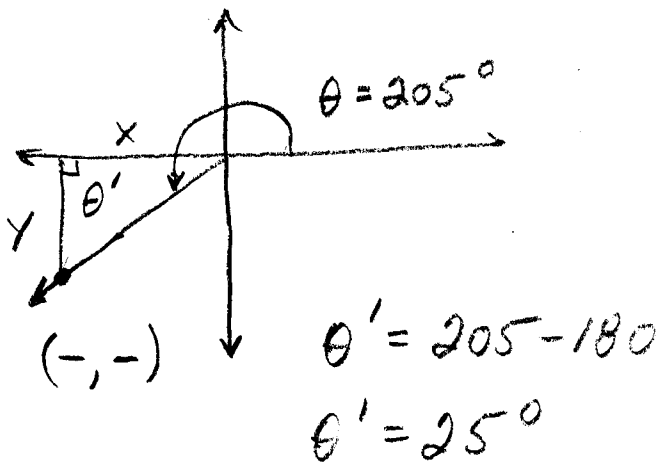
$\theta$	$\sin(\theta)$	
0	0	
10	.2	
20	.3	
30	.5	
40	.7	
50	.8	
60	.9	
70	.9	
80	1.0	
90	1.0	
100	1.0	$\theta' = 80$
110	.9	$\theta' = 70$
120	.9	$\theta' = 60$
130	.8	$\theta' = 50$
140	.7	$\theta' = 40$
150	.5	$\theta' = 30$
160	.3	$\theta' = 20$
170	.2	$\theta' = 10$
180	0	$\theta' = 0$



$\sin(\theta)$  is positive in Quadrants I and II.

WHAT ABOUT QUADRANT III ANGLES?  
 $180^\circ < \theta < 270^\circ$

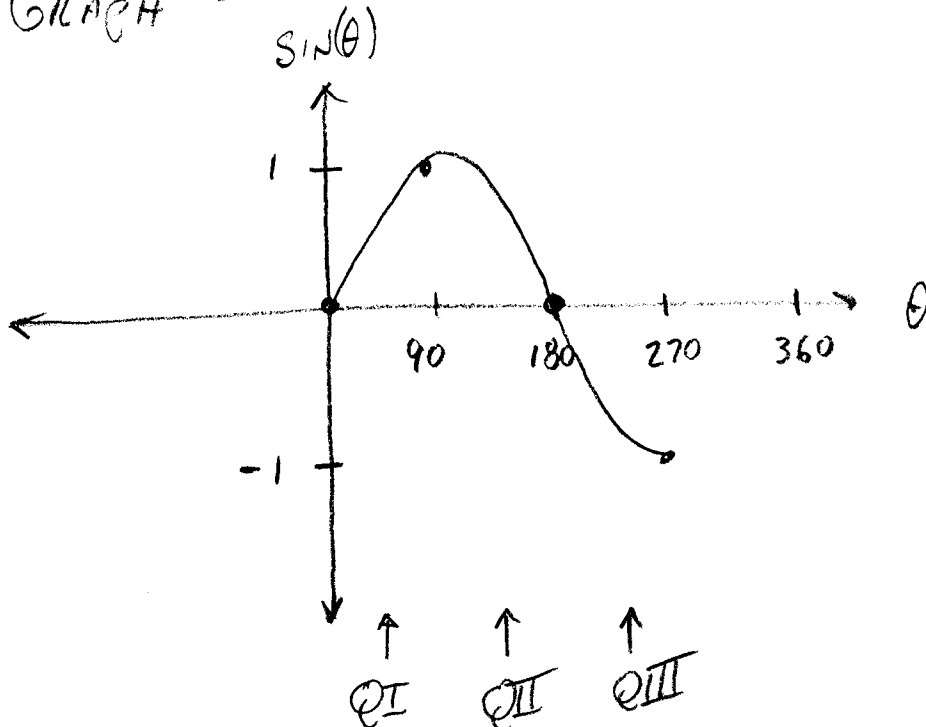
(EX)



BUT  $y$  is  $\ominus$  in QUADRANT III

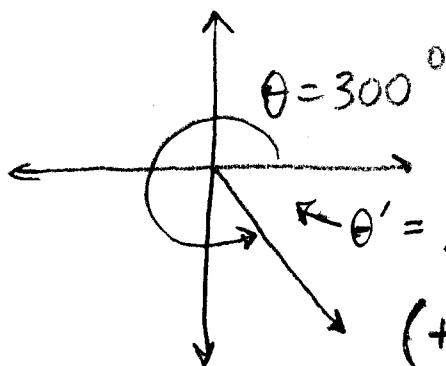
$\therefore \sin(205) = -\sin(25) = -.4226$

GRAPH?



QUADRANT IV?  $270^\circ < \theta < 360^\circ$

(EX)



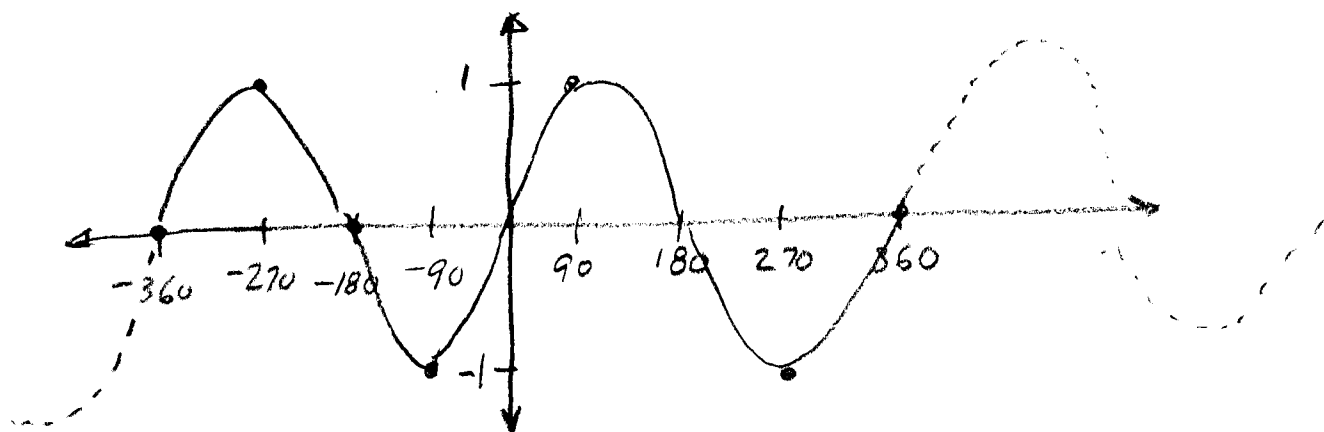
NOTE  
 $+300^\circ$   
 $= -60^\circ$

$$\theta' = 360 - 300 = 60^\circ$$

$(+, -) \therefore y$  is  $\ominus$  in QIV

$$\therefore \sin(300) = -\sin(60) = -.8660$$

GRAPH of  $y = \sin(\theta)$   $\theta$  in degrees



The  $\sin(\theta)$  is a PERIODIC function.

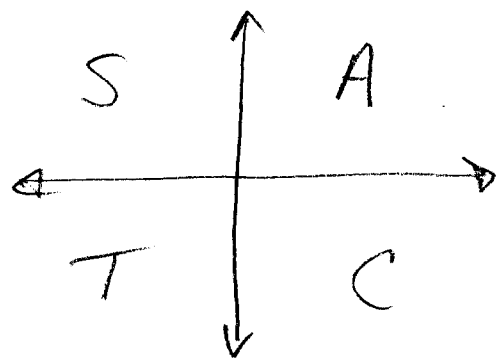
The period is  $360^\circ$ . IT REPEATS.

DOMAIN = ALL real numbers

RANGE =  $-1 \leq y \leq 1$

SINE = from Latin for sinus = "curvy"

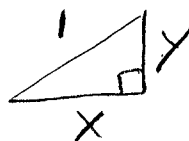
Famous Memory Aid  
 (Almost as big AS SOHCAHTOA)



A SMART Trig CLASS  
 = = = =

Tell you where the SIN, COS, TAN ARE (+)

A  $\Rightarrow$  All (+)



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

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

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

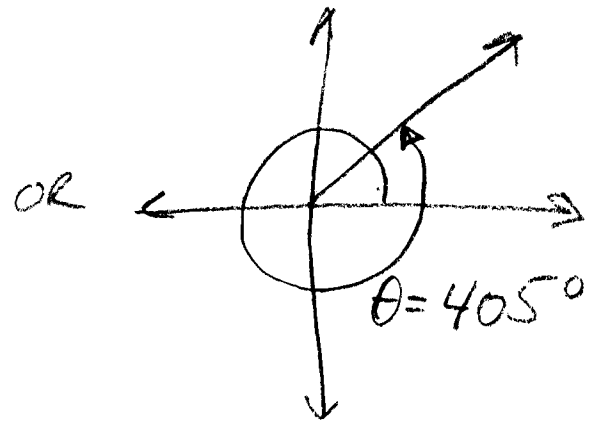
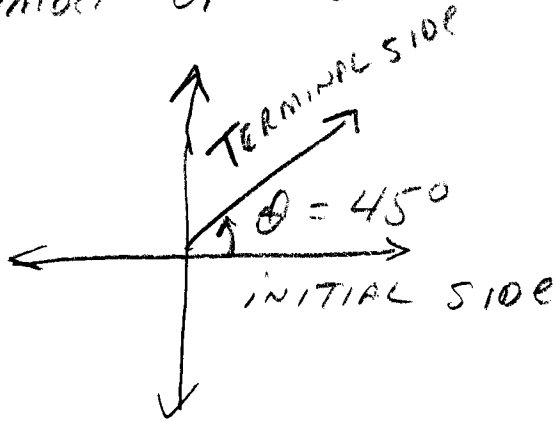
S  $\Rightarrow$  SIN (+)

T  $\Rightarrow$  TAN (+)

C  $\Rightarrow$  COS (+)



BECAUSE THE ANGLES REPEAT EVERY  $360^\circ$   
 ANY PARTICULAR ANGLE HAS AN INFINITE  
 NUMBER OF CO-TERMINAL ANGLES.



OR  $\theta = 765^\circ$  OR  $\theta = -315^\circ$

Homework: Ch 13-2

Pg. 712 # 4-7, 14, 15, 17

Ch 13-3

Pg 722 # 7, 9, 10

