$f(x) = \sin(x)$

$g(x) = \sin(2x+\pi) = f(2x+\pi) = f(2(x+\frac{\pi}{2}))$

The point is on the terminal side of an angle in standard position. Find the exact values of the six trigonometric functions of the angle.

7 $\left(3\frac{1}{2}, -2\sqrt{15}\right)$ Section 1.4

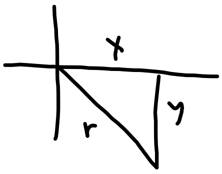
$3 + \frac{1}{2} = \frac{6+1}{2} = \frac{7}{2}$

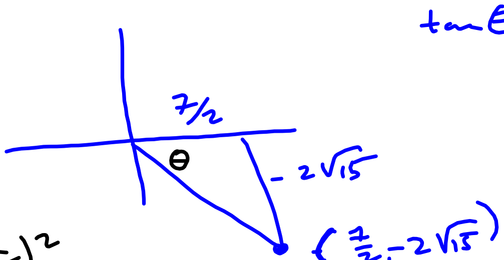
$\sin\theta$

$\cos\theta$

$\tan\theta = -\frac{2\sqrt{15}}{(\frac{7}{2})} = (-2\sqrt{15})(\frac{2}{7}) = \frac{-4\sqrt{15}}{7}$

Stumblin' in the mornings

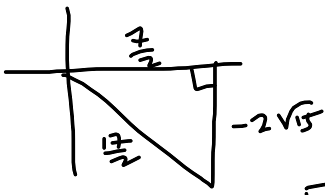




$r^2 = x^2 + y^2$

$= (\frac{7}{2})^2 + (-2\sqrt{15})^2$

$= \frac{49}{4} + 4 \cdot 15 = \frac{49}{4} + \frac{60}{1} \cdot \frac{4}{4} = \frac{49+240}{4} = \frac{289}{4} \Rightarrow r = \sqrt{\frac{289}{4}} = \frac{17}{2} = r$



$\frac{y}{r}$

$\sin\theta = \frac{-2\sqrt{15}}{\frac{17}{2}} = (-2\sqrt{15})(\frac{2}{17}) = \boxed{\frac{-4\sqrt{15}}{17} = \sin\theta}$

$\cos\theta = \frac{x}{r} = \frac{7}{2} \cdot \frac{2}{17} = \boxed{\frac{7}{17} = \cos\theta}$

$\tan\theta = -\frac{2\sqrt{15}}{(\frac{7}{2})} = (-2\sqrt{15})(\frac{2}{7}) = \boxed{\frac{-4\sqrt{15}}{7} = \tan\theta}$

$\csc\theta = -\frac{17}{4\sqrt{15}} \cdot \frac{\sqrt{15}}{\sqrt{15}} = -\frac{17\sqrt{15}}{4 \cdot 15} = \boxed{\csc\theta = -\frac{17\sqrt{15}}{60}}$

$\sec\theta = \frac{17}{7}$

$\cot\theta = \frac{-7}{4\sqrt{15}} \cdot \frac{\sqrt{15}}{\sqrt{15}} = \boxed{\frac{-7\sqrt{15}}{60} = \cot\theta}$

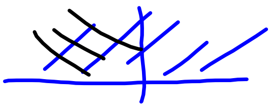
Locate the terminal side of the angle.

Drop a perpendicular to the x-axis.

$\csc\theta > 0$

y

QI or QII



& $\tan\theta < 0$

$\Longrightarrow$ x or y < 0

& y or x > 0

we're in QII

$\csc\theta > 0$

& $\tan\theta < 0$

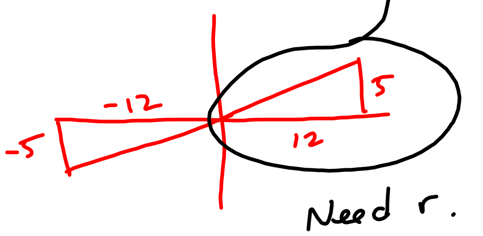
QII

Find the exact values of the remaining trigonometric functions of θ satisfying the given conditions. (If an answer is undefined, enter UNDEFINED.)

$\tan\theta = \frac{5}{12}, \quad \sin\theta > 0$

1.4 #11

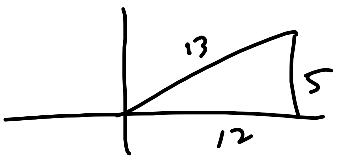
$\tan\theta = \frac{5}{12}$ & $\sin\theta > 0$



$\sin\theta = \frac{5}{13}$	$\csc\theta = \frac{13}{5}$
$\cos\theta = \frac{12}{13}$	$\sec\theta = \frac{13}{12}$
$\tan\theta = \frac{5}{12}$	$\cot\theta = \frac{12}{5}$

Need r. $r^2 = 5^2 + 12^2 = 25 + 144 = 169$

$r = \sqrt{169} = 13$

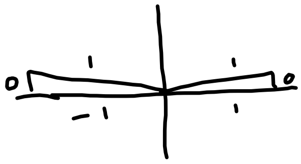


Find the exact values of the remaining trigonometric functions of θ satisfying the given conditions. (If an answer is undefined, enter UNDEFINED.)

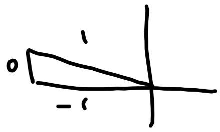
$\cot\theta$ is undefined, $\quad \frac{\pi}{2} \le \theta \le \frac{3\pi}{2}$

$\cot\theta \nexists$

$\tan\theta = 0$



$\frac{\pi}{2} \le \theta \le \frac{3\pi}{2}$



$\sin\theta = 0$

$\cos\theta = -1$

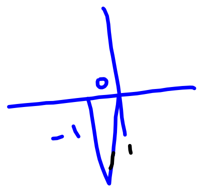
$\tan\theta = 0$

$\csc\theta \nexists$ (DNE)

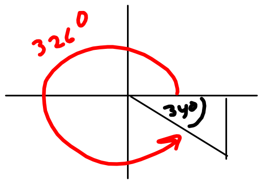
$\sec\theta = -1$

$\cot\theta \nexists$ (DNE)

$\csc\left(\frac{3\pi}{2}\right)$ $\sin(0)$



Reference angle for $\theta = 326^\circ$

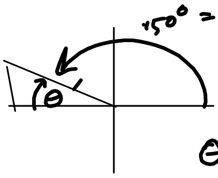


$360^\circ - 326^\circ = 34^\circ$

$\theta' = 34^\circ$

... for $\theta = \frac{5\pi}{6} = \frac{5\cancel{\pi}}{\cancel{6}} \cdot \frac{\cancel{180^\circ}^{30^\circ}}{\cancel{\pi}} = 150^\circ$

$150^\circ = \theta$



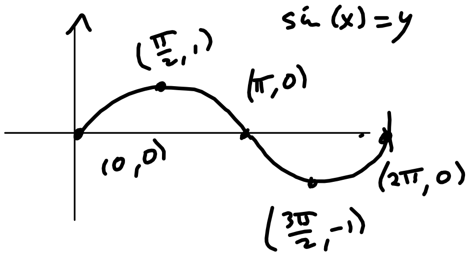
$\theta' = 180^\circ - 150^\circ = 30^\circ \cdot \frac{\pi}{180^\circ} = \frac{\pi}{6}$

$= \pi - \frac{5\pi}{6} = \frac{\pi}{6}$

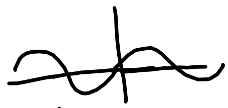
$\theta' = \frac{\pi}{6}$

Section 1.5 - Graphs of trig functions

$\sin(x) = y$

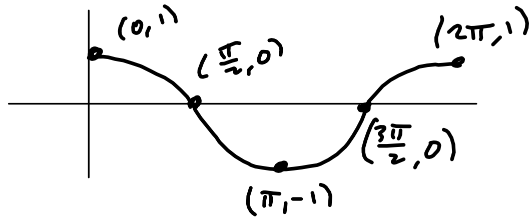


ODD

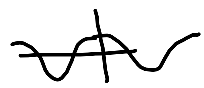


Period $= 2\pi$

$y = \cos(x)$

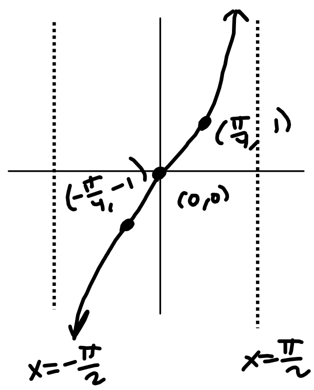


EVEN



Period $= 2\pi$

$y = \tan(x)$



ODD
Period $= \pi$

Vertical Asymptotes

#29

Write an equation for a function with the given characteristics.

A sine curve with a period of 4π, an amplitude of 2, a left phase shift of $\pi/3$, and a vertical translation down 3 units.

$f(x) =$

$y = \sin(x)$

we want $y = a\sin(b(x-c)) + d$

$bx = 2\pi$ when $x = 4\pi$

$4\pi b = 2\pi$

$b = \frac{2\pi}{4\pi} = \frac{1}{2}$ $\quad a\sin\left(\frac{1}{2}(x-c)\right) + d$

Amplitude of 2

$y = 2\sin\left(\frac{1}{2}(x-c)\right) + d$

Left 3

$y = 2\sin\left(\frac{1}{2}(x+3)\right) + d$

Down 3

$\boxed{y = 2\sin\left(\frac{1}{2}(x+3)\right) - 3}$

Shifting & Stretching Functions

$y = f(x)$ BASIC. (x,y) on its graph

$y = 3f(x)$ $\quad y \longmapsto 3y$

$(x,y) \longmapsto (x, 3y)$

$y = f(5x)$

$(x,y) \longmapsto (\frac{1}{5}x, y)$

$y = f(x+c)$ $\quad f(x+7)$ Left 7 $\quad f(x-7)$ RIGHT 7

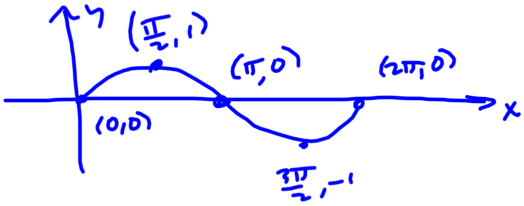
$(x,y) \longmapsto (x-c, y)$

$y = f(x) + 6$

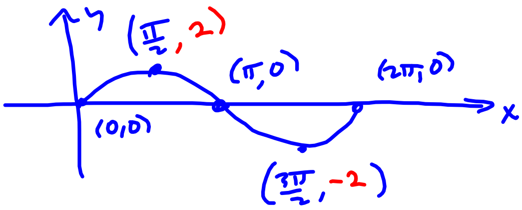
$(x,y) \longmapsto (x, y+6)$

$y = 2\sin\left(\frac{1}{2}(x+3)\right) - 3$

① $f(x) = \sin(x)$

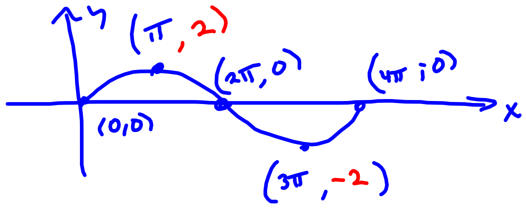


② $2\sin(x)$

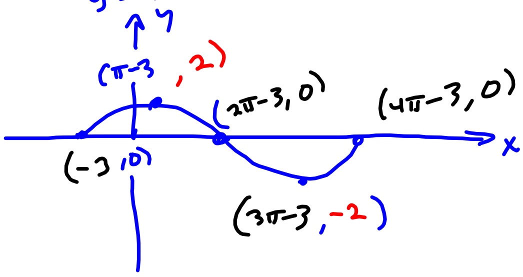


③ $y = 2\sin\left(\frac{1}{2}x\right)$

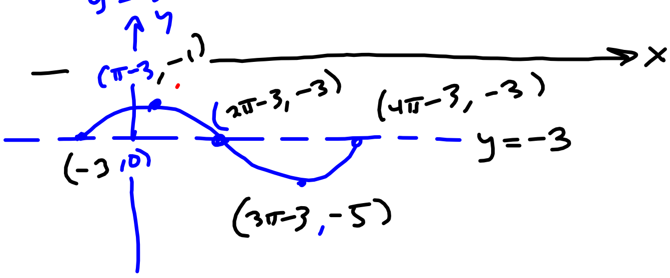
$x \mapsto 2x$



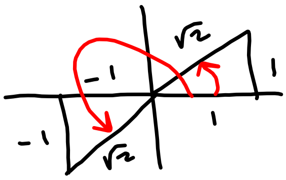
④ $y = 2\sin\left(\frac{1}{2}(x+3)\right)$



⑤ $y = 2\sin\left(\frac{1}{2}(x+3)\right) - 3$



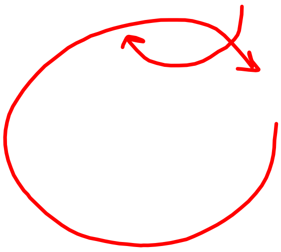
$\tan(x) = 1$ Find all sol'ns in $[-2\pi, 2\pi]$



$x = \frac{\pi}{4}, \frac{5\pi}{4}$

$\frac{\pi}{4} - \pi = -\frac{3\pi}{4}$

$-\frac{3\pi}{4} - \pi = -\frac{7\pi}{4}$



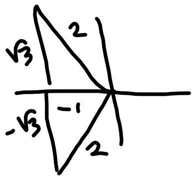
$x = \frac{\pi}{4}$

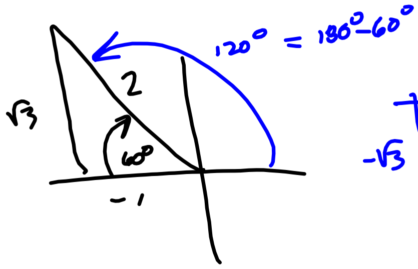
$\frac{\pi}{4} - 2\pi = -\frac{7\pi}{4}$

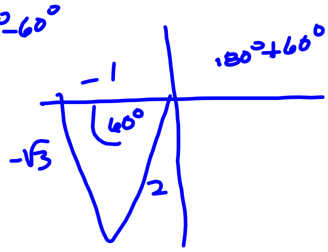
$\frac{5\pi}{4} - 2\pi = -\frac{3\pi}{4}$

$\sec x = -2$

$\cos x = -\frac{1}{2}$







$120^\circ = \frac{2\pi}{3}$

$240^\circ = \pi + \frac{\pi}{3} = \frac{4\pi}{3}$

Then for the other 2 sol'ns in $[-2\pi, 2\pi]$, subtract 2π from answers.