Happy Act Happy Day!

- Park your phones
- Grab your calculators & laptops
- Grab a warm up on the way in

inverse ⇒ angle(s)

Warm-up: Inverse Trig Functions

1. $\cos^{-1}\left(\frac{1}{2}\right) =$ θ

Q1 $60°$ $\frac{\pi}{3}$ Q4 $300°$ $\frac{5\pi}{3}$

2. $arcsin\left(-\frac{\sqrt{3}}{2}\right) =$

3. $\csc^{-1}\left(\frac{5}{9}\right) =$ $\sin^{-1}\left(\frac{9}{5}\right)$ undefined

4. $arctan\left(-\frac{\sqrt{3}}{3}\right) =$

5. $\tan^{-1}(-\sqrt{3}) =$

6. $\cot(240°) =$ $\frac{1}{\tan 240}$ or $\frac{\cos 240}{\sin 240}$ $= \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

giving you the ratio

$\tan 240 = \sqrt{3}$ $60°$ in Q3

7. $\csc^{-1}\left(-\frac{2\sqrt{3}}{3}\right) =$ $\sin^{-1}\left(-\frac{3}{2\sqrt{3}}\right)$ $= \sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$

Q3 $240°$ $\frac{4\pi}{3}$ Q4 $300°$ $\frac{5\pi}{3}$

8. $\sec^{-1}\left(-\frac{2\sqrt{3}}{3}\right)$

9. $\tan^{-1}\left(\frac{8}{5}\right) =$ on calc $58°$ ← ref angle

Q1 $58°$ Q3 $238°$ $+180$ 58

10. **Solve: Give θ in degrees**

$7\cos(\theta) = 4$

$\cos\theta = \frac{4}{7}$

$\cos^{-1}\left(\frac{4}{7}\right) = \theta$

$55.15°$

S | A

T | C

Q1 $55.15°$ Q4 $304.85°$

$360 - 55.15$

Inverse Trig – Extra Practice

Find the exact value of each expression without using a calculator: Write your answers in **radians.**

a) $\cos^{-1}\left(\frac{1}{2}\right)$ b) $\sin^{-1}\left(-\frac{\sqrt{2}}{2}\right)$ c) $arcsin(0)$

d) $arccos\left(\frac{\sqrt{3}}{2}\right)$ e) $arctan(-\sqrt{3})$ f) $\csc^{-1}(-2)$

Find the exact value of each expression using a calculator: Write your answers in **degrees.** almost always 2 answers

g) $\sin^{-1}(-.45)$ h) $\tan^{-1}(-1.26)$ i) $\sec^{-1}\left(\frac{5}{4}\right)$

switch x, y ; solve for y.

Writing Inverse Functions

Write the equation of the inverse function:

inverse

$y = \cos(x) - 5$

$x = \cos(y) - 5$

$\cos^{-1}(x+5) = \cos(y)$ $\cos^{-1}$

$\cos^{-1}(x+5) = y$

Example: Write the equation of the inverse function:

$y = \sin^{-1}(x+2)$

$\sin(x) = \sin^{-1}(y+2)$ $\sin$

$\sin(x) = y+2$

$\sin(x) - 2 = y$

Write the equation for the inverse of the following functions:

1. $y = \sin(2x)$
2. $y = \arccos(\frac{1}{3}x)$
3. $y = \tan\left(\frac{1}{2}\theta\right) + 1$
4. $y = \cos(x) + 3$
5. $y = \arctan(\theta) - 2$
6. $y = \cos^{-1} x + 4$
7. $y = \sin(x + \pi)$
8. $y = \sin^{-1}(x + 3)$

Factor
1. GCF
2. Guess + Check 3 term
3. Diff. of 2 Square
4. 4 terms => Grouping

Factoring Trigonometric Expressions:

Factor each of the following expressions.

$16x^2 - 81y^2$

Diff of 2 squares

$16\cos^2(\theta) - 81\sin^2(\theta)$

$(4\cos\theta + 9\sin\theta)(4\cos\theta - 9\sin\theta)$

$25\sin^2(\theta) - 49\cos^2(\theta)$

$x^2 - 10x + 16$

$\sin^2 x - 10\sin x + 16$

$(\sin x - 8)(\sin x - 2)$

$2\cos^2 x - \cos x - 1$

$2\sin^2 x - \sin x - 3$

$4x^2 - 8x$

$4\sin^2(\theta) - 8\sin(\theta)$

$6\cos^2 x - 7\cos x + 2$

$\sin^3 x - 9\sin x$

$\sin x(\sin^2 x - 9)$

$\sin x(\sin x - 3)(\sin x + 3)$

$\sin^4 x - 5\sin^2 x - 6$

$\cos^4\theta - 8\cos^2\theta + 7$

$\cos^4\theta - 16$

$9\sin^4\theta - 25$

$(\cos^2\theta - 4)(\cos^2\theta + 4)$

$(\cos\theta + 2)(\cos\theta - 2)(\cos^2\theta + 4)$

Solving Easy Trigonometric Equations (no calculator) – Part 1

For the following examples, give answers in radians $(0 \le x \le 2\pi)$ within, may have up to 2, 3.

$\cos(x) = -\frac{1}{2}$ $\quad \cos^{-1}\left(-\frac{1}{2}\right)$

$x = \cos^{-1}\left(-\frac{1}{2}\right)$

Q2 $\frac{2\pi}{3}$ Q3 $\frac{4\pi}{3}$

$\sec(x) = -\frac{2\sqrt{3}}{3}$ $\quad \sec^{-1}\left(-\frac{2\sqrt{3}}{3}\right)$

$x = \sec^{-1}\left(-\frac{2\sqrt{3}}{3}\right)$

$x = \cos^{-1}\left(\frac{-3}{2\sqrt{3}}\right)$

$x = \cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$

Q2 $\frac{5\pi}{6}$ Q3 $\frac{7\pi}{6}$

$\sin(x) = \frac{\sqrt{3}}{2}$ $\quad \sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$

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

Q1 $\frac{\pi}{3}$ Q2 $\frac{2\pi}{3}$

Homework:

$\csc(x) = -2$ $\quad \tan(x) = -1$ $\quad 2\cos(x) = \sqrt{2}$

☆ $2\cos x - 3 = 0$

☆ $3\cos x - 2 = 0$

☆ $4\sin x - 1 = 0$

$\sin x - \sqrt{2} = -\sin x$

$+\sin x \quad +\sin x$

$2\sin x - \sqrt{2} = 0$

$2\sin x = \sqrt{2}$

$\sin x = \frac{\sqrt{2}}{2}$ ...

Solving Trig Equations (calc active) – Part 1 continued

Solve each trigonometric equation. Give answers in degrees.

Quick Review:

$\sin^{-1}(\sin(x)) = -\frac{4}{5}$

$x = \sin^{-1}\left(-\frac{4}{5}\right)$

"y"

Q3 Q4

$\theta = 233.18° \quad 306.87°$

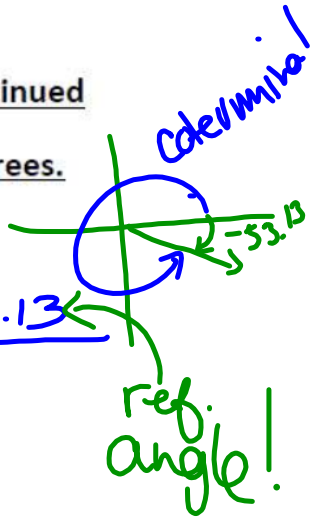
$360 - 53.13$

Q4

180

$+ 53.13$ ← ref angle.

Q3



Homework:

1. $5\cos(\theta) = -2$

2. $\cos(\theta) = -0.3$

Ref angle: 66.42

Q2 = 113.58

Q3 = 246.42

180 − 113.58

180 + 66.42

3. $\tan(\theta) = -\frac{7}{24}$

4. $\sec(\theta) = -\frac{25}{7}$

5. $3\sin(\theta) = 2$

Would the given x-value represent a solution for the trig equation? Show all work to defend your answer.

$\cos\frac{\pi}{6}=\frac{\sqrt{3}}{2}$

1. $x=\frac{\pi}{6};\ 2\cos^2(x)-7\cos(x)=4$

$2\cos^2\left(\frac{\pi}{6}\right)-7\cos\left(\frac{\pi}{6}\right) \stackrel{?}{=} 4$

$2\left(\frac{\sqrt{3}}{2}\right)^2-7\left(\frac{\sqrt{3}}{2}\right)=4$

$2\left(\frac{3}{4}\right)-\frac{7\sqrt{3}}{2}=4$ ← irrational #

$\frac{3}{2}-\frac{7\sqrt{3}}{2}=4$ ← Rational number

no, not a solution

2. $x=\frac{5\pi}{4};\ 3\tan^2(x)=8\tan(x)-5$ yes

3. $x=\frac{3\pi}{2};\ \sin^3(x)-4\sin^2(x)-2\sin(x)=-3$ yes

4. $x=-\frac{\pi}{3};\ 6\cos^2(x)-7\cos(x)-2=0$ no

$$\frac{\tan\theta}{\sec\theta - 1} + \frac{\tan\theta}{\sec\theta + 1}$$

$$\frac{2\sec\theta}{\tan\theta} = \frac{2 \cdot \frac{1}{\cos\theta}}{\frac{\sin\theta}{\cos\theta}} = \frac{2}{\sin\theta} = 2\csc\theta$$