$$\tan\theta \sin\theta + 1$$

$$= \frac{\sin\theta}{\cos\theta} \cdot \frac{\sin\theta}{1} + \frac{\cos\theta}{\cos\theta}$$

$$= \frac{(\sin\theta)^2 + \cos\theta}{\cos\theta} = \frac{\sin^2\theta + \cos\theta}{\cos\theta}$$

Beware $\sin^{-1}x$ which means $\arcsin(x)$

= the angle whose sine is x

(Inverse sine)

Otherwise $\sin^n\theta$ means $(\sin\theta)^n$

$(1+\cos\theta)(1-\cos\theta)$

$= 1^2 - \cos^2\theta = 1-\cos^2\theta = \sin^2\theta$

$(a-b)(a+b) = a^2-b^2$

$$\frac{\tan\beta + \cot\beta}{\tan\beta} = \csc^2\beta$$

$$\frac{\frac{\sin\beta}{\cos\beta} + \frac{\cos\beta}{\sin\beta}}{\frac{\sin\beta}{\cos\beta}}$$

α	alpha
β	beta
γ	gamma
δ	delta
ξ	"Ksee"
ε	epsilon

$$\frac{\cos\beta}{\sin\beta}\left[\frac{\sin\beta}{\cos\beta}\cdot\frac{\sin\beta}{\sin\beta} + \frac{\cos\beta}{\sin\beta}\cdot\frac{\cos\beta}{\cos\beta}\right]$$

$$\Rightarrow \frac{\cos\beta}{\sin\beta}\left[\frac{\sin^2\beta+\cos^2\beta}{\sin\beta\cos\beta}\right] = \frac{1}{\sin\beta}\left[\frac{1}{\sin\beta}\right]$$

$$= \frac{1}{\sin^2\beta} = \csc^2\beta$$ See?

Reciprocal Identities.

$$\sec\beta = \frac{1}{\cos\beta}$$

$$\csc\beta = \frac{1}{\sin\beta}$$

$$\cot\beta = \frac{1}{\tan\beta}$$

Pythagorean Identities

$$\sin^2\theta + \cos^2\theta = 1$$

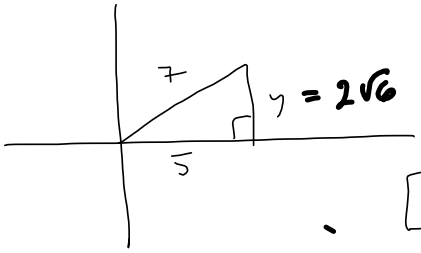
$$\tan^2\theta + 1 = \sec^2\theta$$

$$\cot^2\theta + 1 = \csc^2\theta$$

Suppose $\cos\theta = \frac{5}{7}$ and $\sin\theta < 0$

$\cos\theta = \frac{5}{7}$:

Find values of all 6 trig functions.



Pythagorus sez:

$7^2 - 5^2 = 49 - 25 = 24 = y^2$

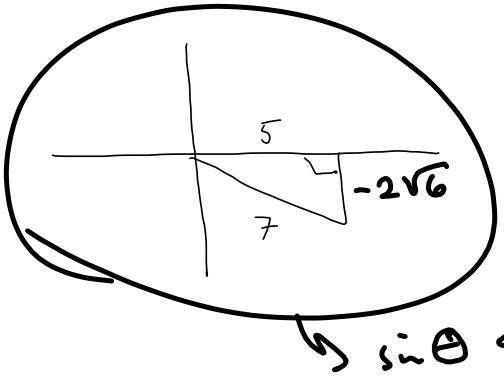
$5^2 + y^2 = 7^2$

$y^2 = 24$

$y = \pm\sqrt{24} = \pm 2\sqrt{6}$

2 | 24
2 | 12
2 | 6
3

$\sqrt{24} = 2\sqrt{6}$

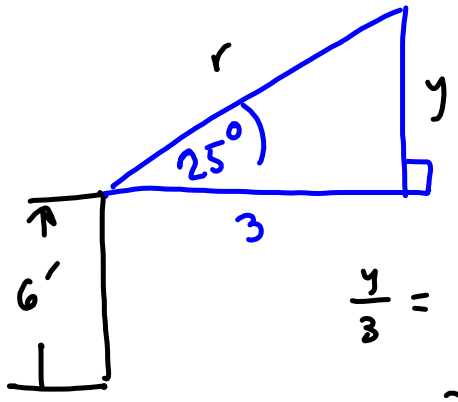


$\sin\theta < 0$

$\sin\theta = \frac{-2\sqrt{6}}{7}$ $\quad \csc\theta = -\frac{7}{2\sqrt{6}}$

$\cos\theta = \frac{5}{7}$ $\quad \sec\theta = \frac{7}{5}$

$\tan\theta = \frac{-2\sqrt{6}}{5}$ $\quad \cot\theta = -\frac{5}{2\sqrt{6}}$



How tall is the other guy?

$\frac{y}{3} = \tan 25^0$

radians

$y = 3\tan 25^0 = 3\cdot\tan\left(\frac{25\cdot Pi}{180}\right) \approx 1.398922975$

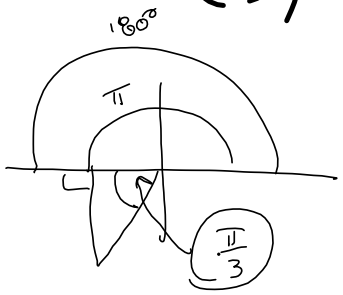
$\approx 1.4\text{ ft} \approx y \Rightarrow$

man is 7.4 ft tall!

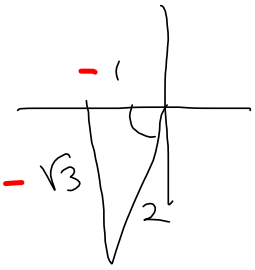
Trig for any angle!

$\cos\left(\frac{4\pi}{3}\right) =$

$\frac{3\pi}{3} + \frac{1\pi}{3}$

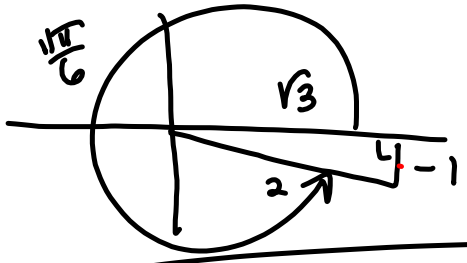


$\left(\frac{4\pi}{3}\right)\left(\frac{180^\circ}{\pi}\right) = 4 \cdot 60 = 240^\circ$



$\cos\left(\frac{4\pi}{3}\right) = -\frac{1}{2}$

Find 6 things for $\theta = \frac{11\pi}{6} = 330^\circ$



$\sin\frac{11\pi}{6} = -\frac{1}{2}$ $\quad \csc\frac{11\pi}{6} = -2$

$\cos\frac{11\pi}{6} = \frac{\sqrt{3}}{2}$ $\quad \sec\frac{11\pi}{6} = \frac{2}{\sqrt{3}}$

$\tan\frac{11\pi}{6} = -\frac{1}{\sqrt{3}}$ $\quad \cot\frac{11\pi}{6} = -\sqrt{3}$

$\cos 4^\circ 50' 15''$ degrees, minutes, seconds.

$= \cos\left(4 + \frac{50}{60} + \frac{15}{3600}\right)$