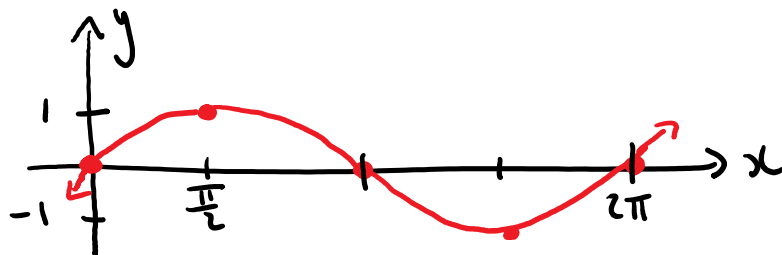


x	$y = \sin x$
0	0
$\pi/2$	1
π	0
$3\pi/2$	-1
2π	0



Odd function

Same when rotated by 180°

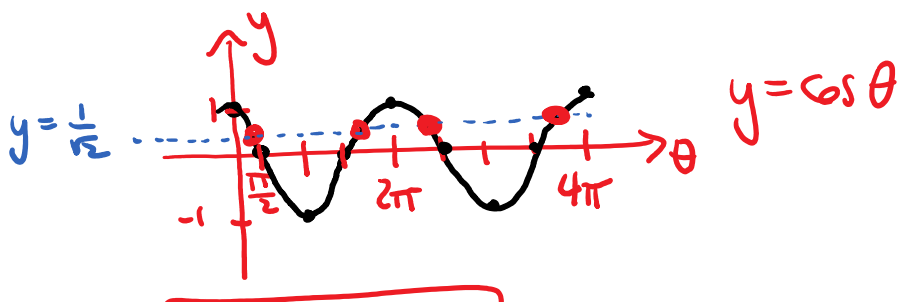
$$f(-x) = -f(x)$$

Quiz Tues 9th 8.2

8.3 Trig Equations Cont'd

Ex: Solve $\cos \theta = \frac{1}{\sqrt{2}}$ on $0 \leq \theta \leq 4\pi$

1) How many solutions?



4 solutions

2) Reference Angle

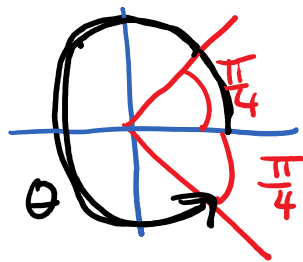
$$\cos \theta = \frac{1}{\sqrt{2}}$$

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

3) CAST Rule

S	A
T	C

$$\cos \theta > 0$$



$$\begin{aligned}\theta &= 2\pi - \frac{\pi}{4} \\ &= \frac{7\pi}{4}\end{aligned}$$

4) Period

$\cos \theta$ has period 2π

$$\theta = \frac{\pi}{4}, \frac{7\pi}{4}, \frac{9\pi}{4}, \frac{15\pi}{4}$$

+2π

+2π

8.4 Trig Identities

Equation: true for some x -values

e.g. $x^2 = 9$
 $x = \pm 3$

Identity: true for all x -values (in the domain)

e.g. $\sin^2 x + \cos^2 x = 1$

Summary of Identities:

1) Basic Identities

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta}$$

2) Reciprocal Identities

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

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

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

3) Pythagorean Identities

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

$\div \sin^2 x$



$\div \cos^2 x$



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

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

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

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

4) Odd/Even Identities

$$\sin(-\theta) = -\sin \theta$$

$$\csc(-\theta) = -\csc \theta$$

$$\tan(-\theta) = -\tan \theta$$

$$\cot(-\theta) = -\cot \theta$$

$$\cos(-\theta) = \cos \theta$$

$$\sec(-\theta) = \sec \theta$$

Ex: Establish the identity

$$\frac{\cos^2 \theta + 7\cos \theta + 12}{\cos^2 \theta + 3\cos \theta} = 1 + 4\sec \theta$$

→ Start with the more complicated side

$$\frac{\cos^2 \theta + 7\cos \theta + 12}{\cos^2 \theta + 3\cos \theta} = \frac{(\cancel{\cos \theta + 3})(\cos \theta + 4)}{\cos \theta (\cancel{\cos \theta + 3})}$$

Factor

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

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

$$= 1 + 4 \sec \theta$$

