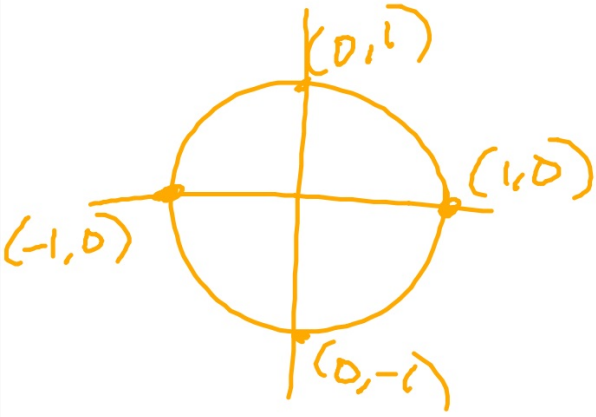
10.1 Graphing Sine and Cosine Functions

We can use the unit circle to graph y = sinx and y = cosx

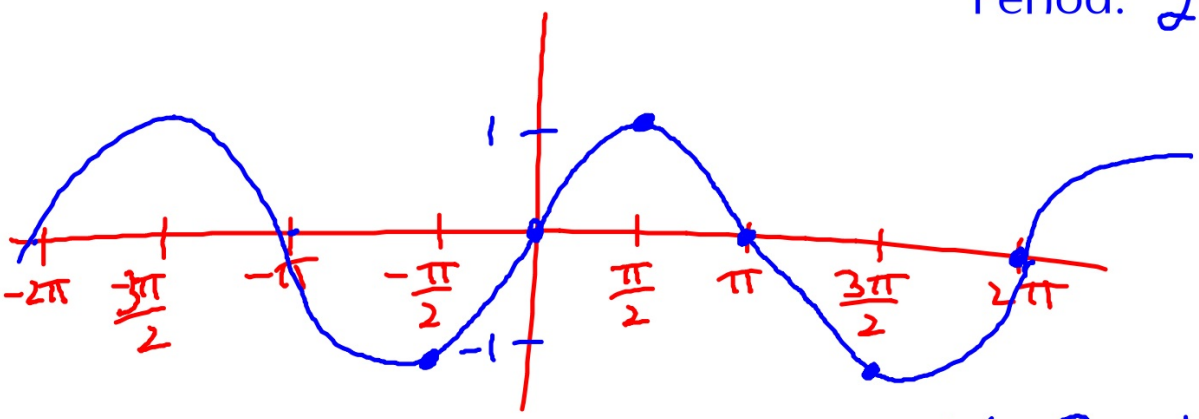


$\sin\frac{\pi}{2} = 1 \quad \left(\frac{\pi}{2}, 1\right)$

$\cos\pi = -1 \quad (\pi, -1)$

$y = \sin x$

Period: 2π



D: $\{x \mid x \in R\}$

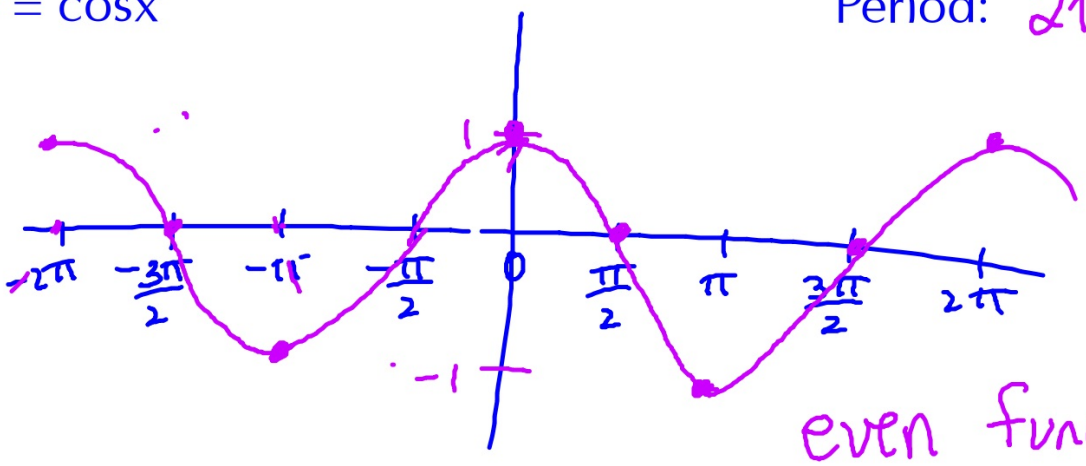
R: $\{y \mid -1 \leq y \leq 1\}$

odd function

symm. with origin

y = cosx

Period: 2π



even function

symm. w/ y-axis

D: $\{x \mid x \in R\}$

R: $\{y \mid -1 \leq y \leq 1\}$

Transformations

$y = 3\sin 2x - 1$

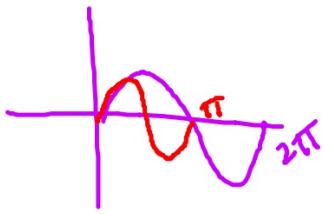
y = asinb(x - c) + d or y = acosb(x - c) + d

a: Amplitude | a | $a = 3$ Amp = 3

b: This value determines the period of the function

period = 2pi/b Period $= \frac{2\pi}{2} = \pi$

$b = 2$



c: phase shift (aka horizontal translation)

d: vertical shift $d = -1$ down 1 unit

$$y = 3\sin 2x - 1$$

Amp: 3

period: π

$\downarrow$ 1

increments

$$\frac{\text{period}}{4} = \frac{\pi}{4}$$