

Lecture 13

Tuesday, April 25, 2023 8:05 AM

* Questions ...

* Conversion between radian and degree

$$\theta^\circ \rightarrow \frac{\theta}{180} \pi \text{ radian}$$

$$\left(\frac{180}{\pi} \alpha\right)^\circ \leftarrow \alpha$$

$$\underline{\underline{Ex}} \quad 30^\circ = \frac{30}{180} \pi = \frac{\pi}{6} \text{ radian}$$

$$60^\circ = \frac{60}{180} \pi = \frac{\pi}{3}$$

$$45^\circ = \frac{45}{180} \pi = \frac{\pi}{4}$$

$$90^\circ = \frac{90}{180} \pi = \frac{\pi}{2} \dots$$

$$\underline{\underline{Ex}} \quad -\frac{\pi}{4} = \frac{180}{\pi} \left(-\frac{\pi}{4}\right) = -45^\circ$$

$$\frac{3\pi}{4} = \frac{180}{\pi} \left(\frac{3\pi}{4}\right) = \frac{540}{4} = 135^\circ$$

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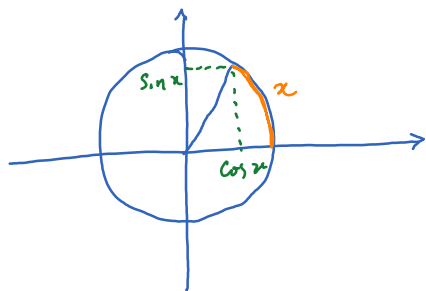
Trigonometric functions

We will learn 6 trigonometric functions.

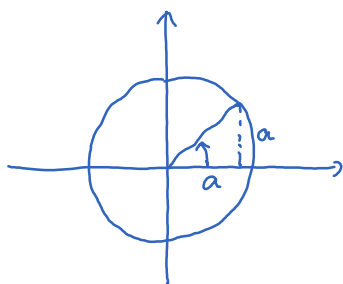
They are built upon 2 basic trigonometric functions: sine and cosine.

Sine function: $\sin(x)$ or simply $\sin x$

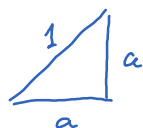
Cosine function: $\cos(x)$ or simply $\cos x$



Ex



$$\sin 45^\circ = ?$$



Pythagorean theorem: $a^2 + a^2 = 1$

$$\Rightarrow a^2 = \frac{1}{2}$$

Because $a > 0$, $a = \frac{1}{\sqrt{2}}$. Thus,

$$\sin 45^\circ = \cos 45^\circ = \frac{1}{\sqrt{2}}$$

Ex

$$\sin \frac{\pi}{4} = \frac{1}{\sqrt{2}}$$

$$\cos \frac{\pi}{4} = \frac{1}{\sqrt{2}}$$

$$\sin \frac{\pi}{2} = 1$$

$$\cos \frac{\pi}{2} = 0$$

$$\sin \pi = 0$$

$$\cos \pi = -1$$