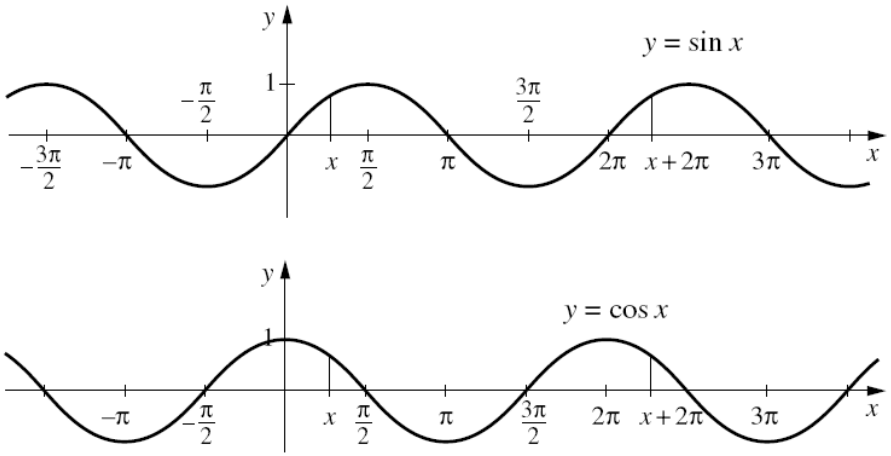
Trigonometriset funktiot

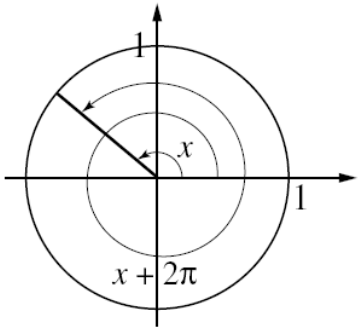
- Trigonometriset funktiot ovat *jaksollisia*, koska ne määritellään yksikköympyrän avulla
- Jaksollisen funktion arvot toistuvat tasaisin välein
  - ks. täsmällinen määritelmä s. 54 alaviite

Sinifunktion ja kosinifunktion jaksot



$$\sin(x + 2\pi) = \sin x$$

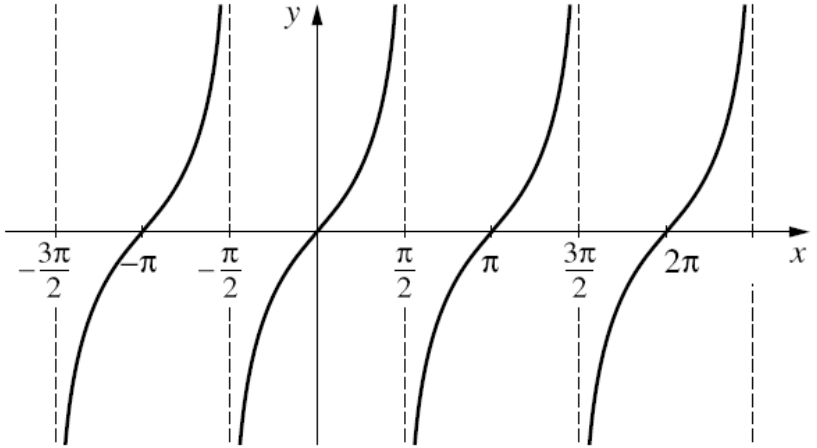
$$\cos(x + 2\pi) = \cos x$$



Sini- ja kosinifunktion määrittelyjoukko on $\mathbb{R}$.
Arvojoukko on [-1, 1].

Sini- ja kosinifunktion jakso on 2π

Tangenttifunktion jakso

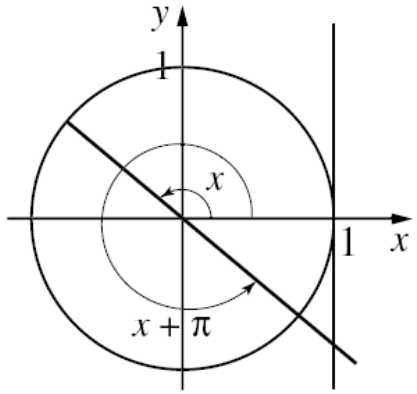


Tangenttifunktion määrittelyehto:

$$x \neq \frac{\pi}{2} + n\pi \qquad n \in \mathbb{Z}$$

Tangenttifunktion arvojoukko on $\mathbb{R}$.

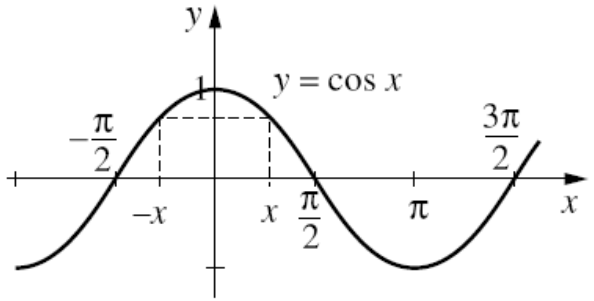
$$\tan(x + \pi) = \tan x$$

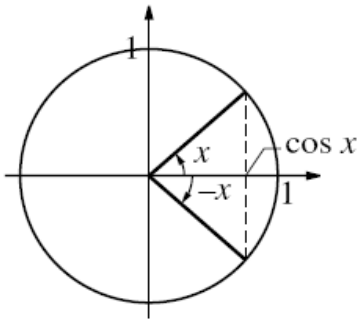


Tangenttifunktion jakso on π, sillä kulmilla x ja $x + \pi$ on sama tangenttipiste.

Symmetriat

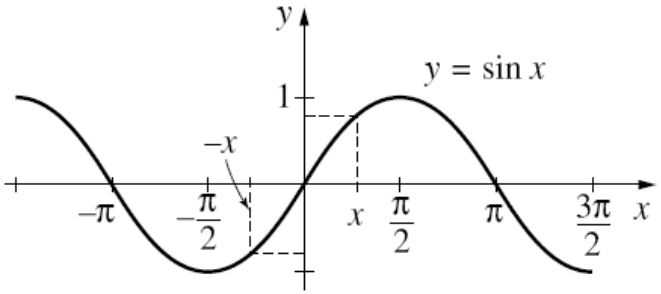
Kulma ja vastakulma

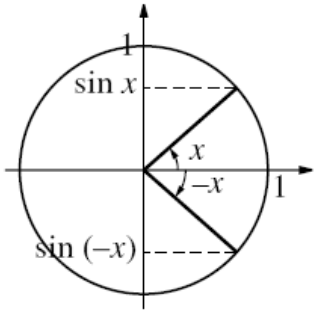




$$\cos(-x) = \cos x$$

Kosini on *parillinen funktio*: *f(-x) = f(x)*

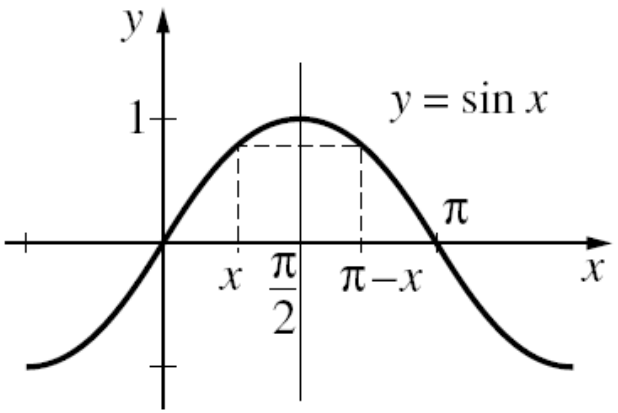


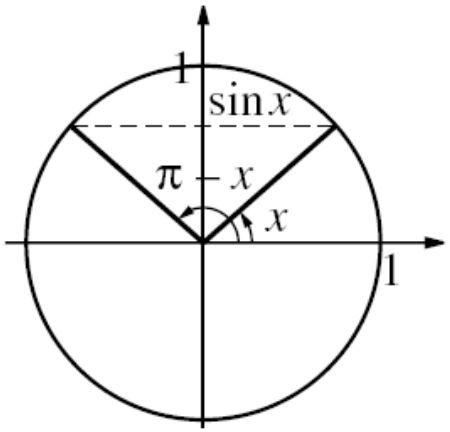


$$\sin(-x) = -\sin x$$

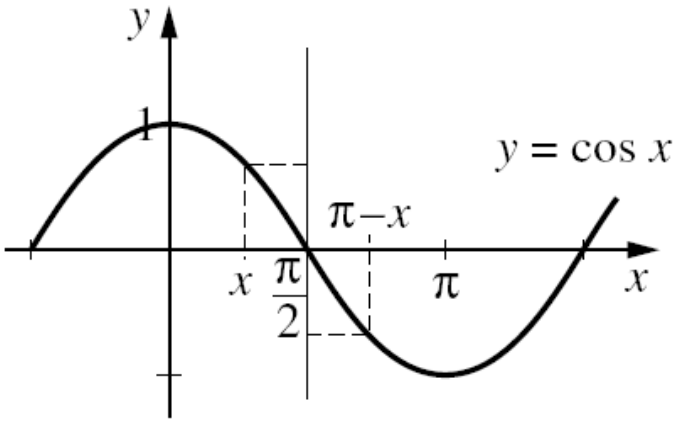
Sini on *pariton funktio*: *f(-x) = -f(x)*

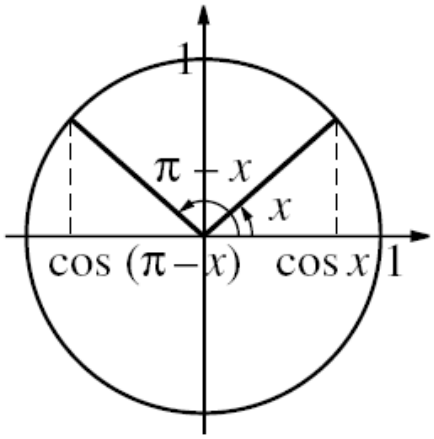
Kulma ja suplementtikulma





$$\sin(\pi - x) = \sin x$$





$$\cos(\pi - x) = -\cos x$$