

Übung 04

Vom 15.1.2024

Vorbereitung zur Aufnahme auf das Studienkolleg

Organisation

Januar 2024

Kalender

pedia

Informationen zum Kalender

KW	Montag	Dienstag	Mittwoch	Donnerstag	Freitag	Samstag	Sonntag
1	1	2	3	4	5	6	7
2	8	9	10	11	12	13	14
3	15	16	17	18	19	20	21
4	22	23	24	25	26	27	28
5	29	30	31	1	2	3	4

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1.: Neujahrstag

Angaben ohne Gewähr

- Wir bleiben im Online Format im neuen Jahr!
- Montag & Mittwoch
- Uhrzeit 16.00 – 17.30 Uhr
- Letzte Session am 31.1
- Übungen von nun an:
 - Gemeinsam Lösungen finden
- Muster Tests 1x die Woche:
 - Besprechung im Anschluss

Aufnahmeprüfung
Deutsch und
Mathematik
München

Montag den
05.02.2024
um 9:00 Uhr

<https://studienkolleg->

Themen-Gebiete Gesamt

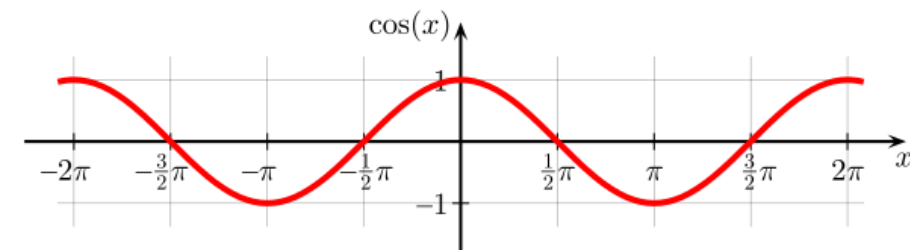
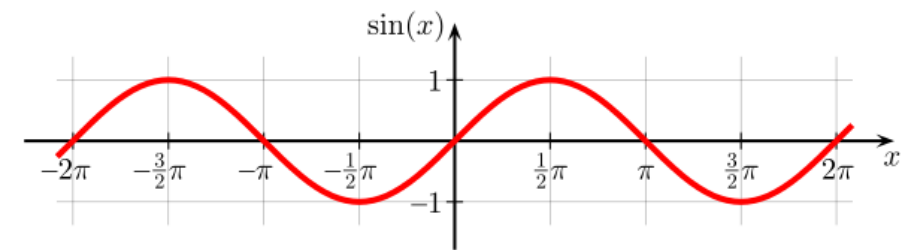
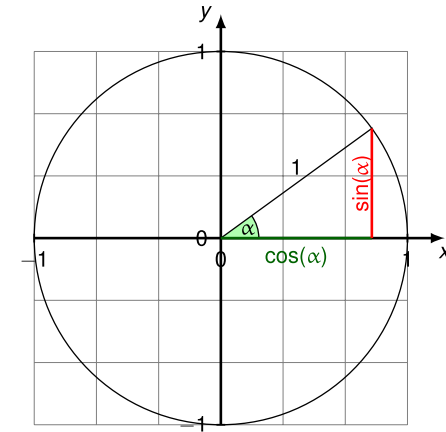
- Vereinfachung von Bruchtermen
- Polynomdivision
- Wurzelgleichungen - Ungleichungen
- Exponentialgleichungen & Logarithmusgleichungen
- Trigonometrischen Funktionen
- Erkennen von Funktionsgraphen
- Geometrie ; vor allem Satzgruppe des Pythagoras, Strahlensätze, Kreisberechnungen, Flächen- und Volumenberechnungen

Sinus & Cosinus

$$\sin^2(\alpha) = 1 - \cos^2(\alpha)$$

Wertetabelle :

Winkel in Grad	0°	30°	45°	60°	90°	180°	270°	360°
Winkel in Bogenmaß	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	π	$\frac{3}{2}\pi$	2π
$\sin \alpha = y$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	0	-1	0
$\cos \alpha = x$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	-1	0	1



Sinus Funktion

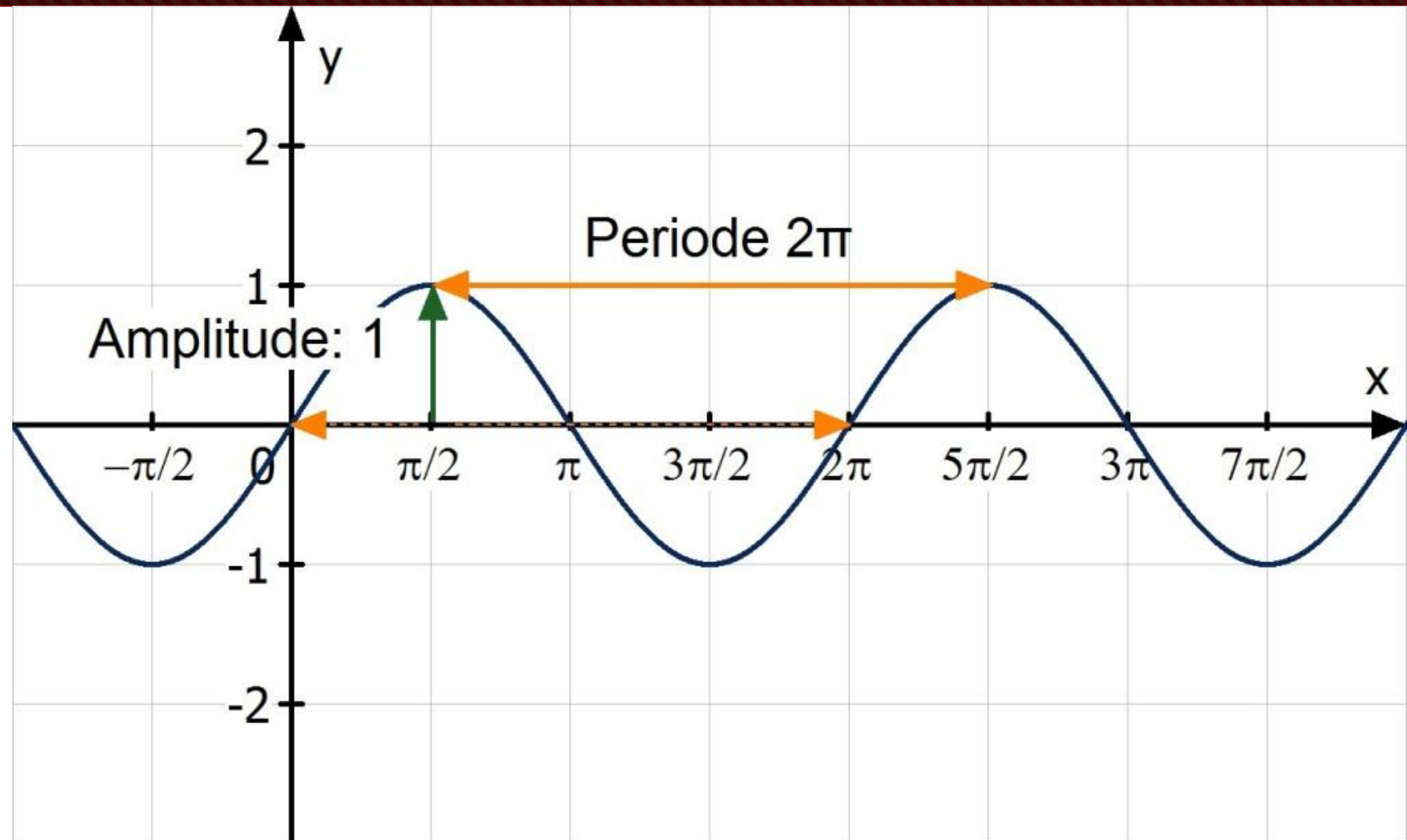
Der Sinus ist:

$$\sin(x)=y$$

○ $2\pi = 360$ Grad

○ $2\pi = 360^\circ$

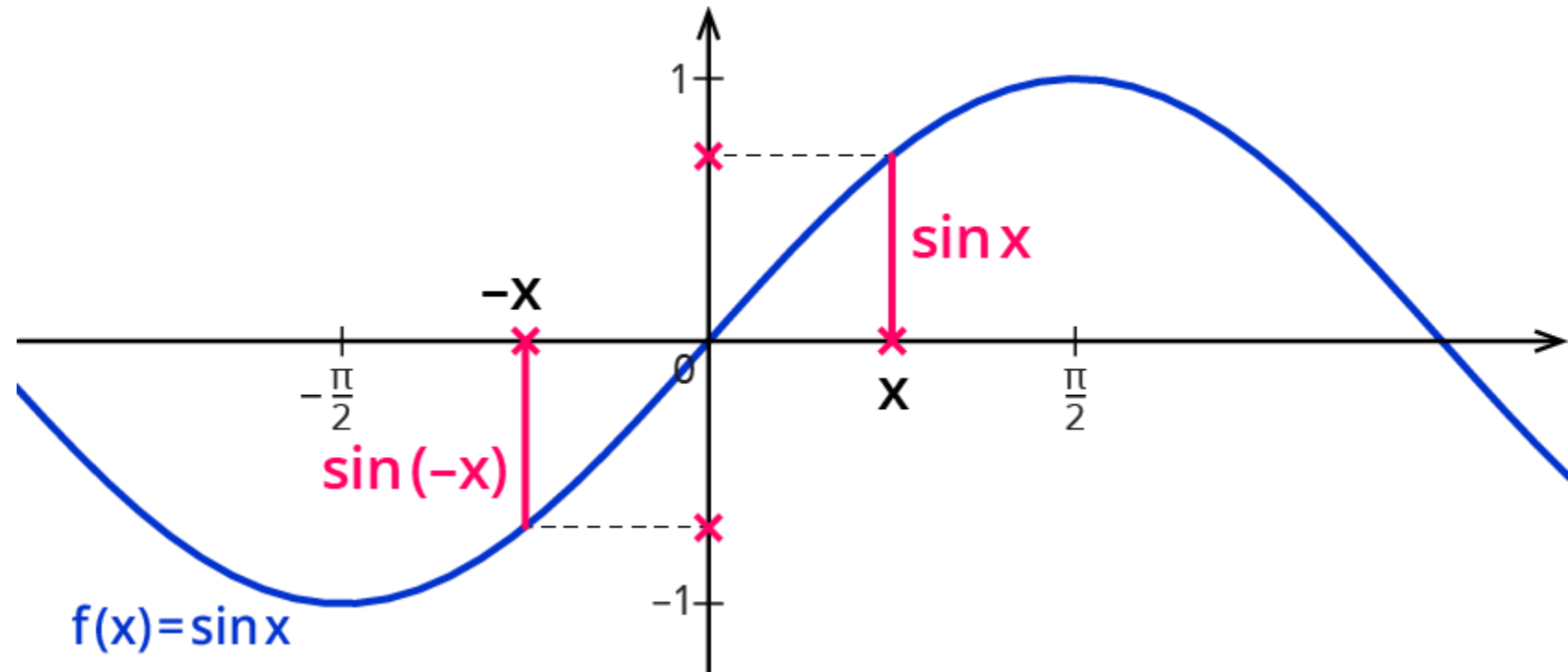
○ 2π -Periodisch



Sinus Funktion

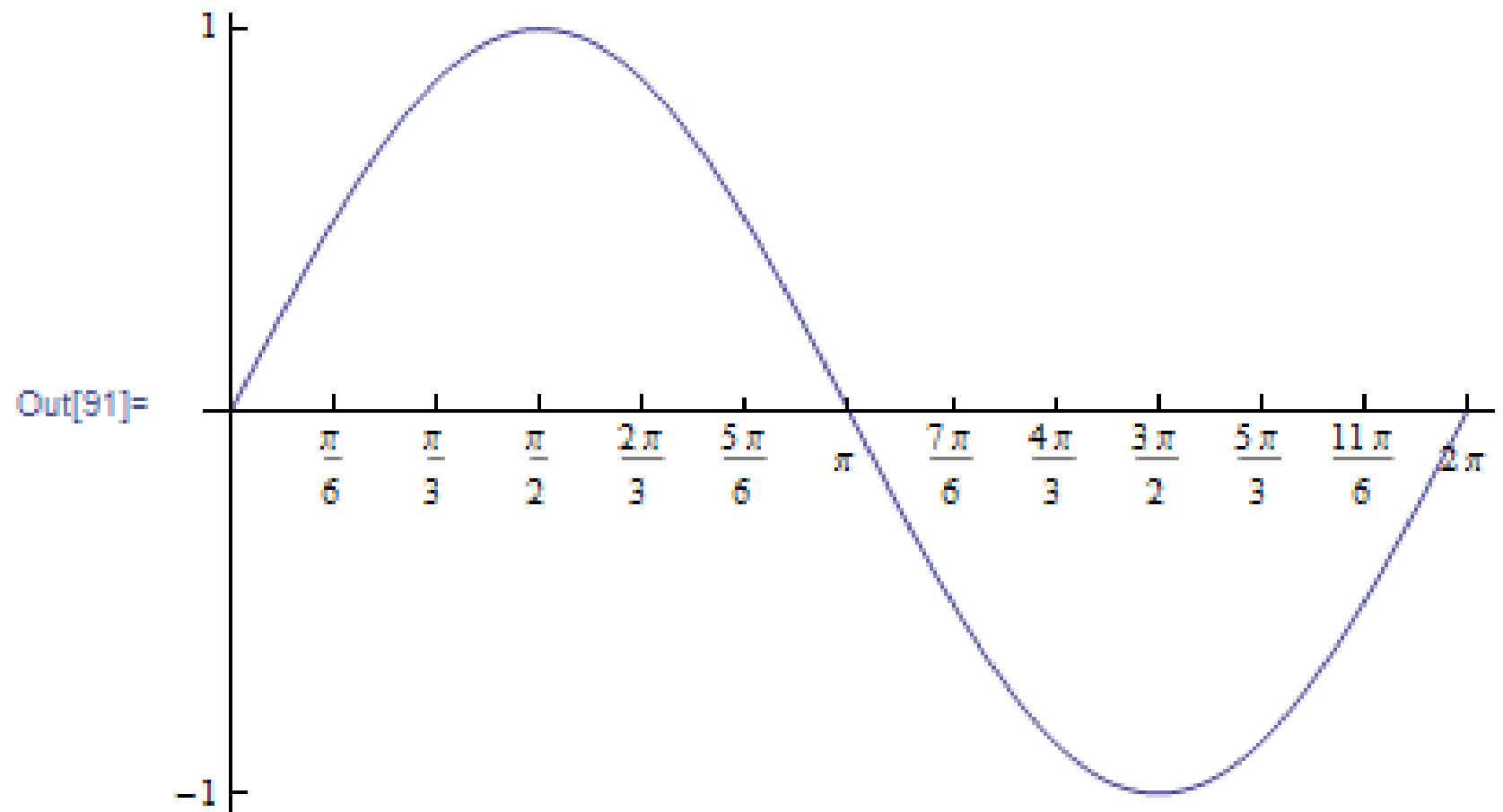
Der Sinus ist:

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



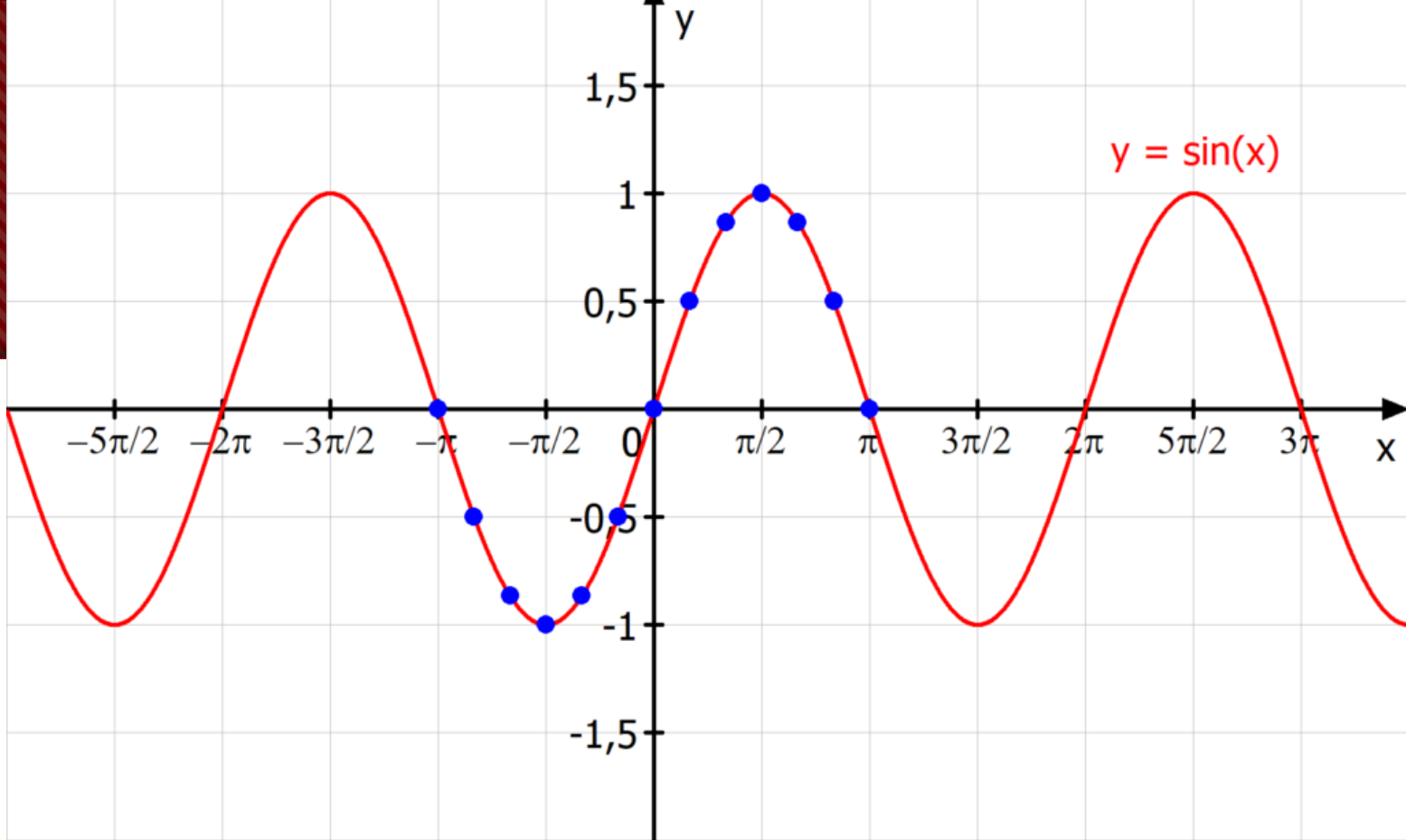
$$Y = \sin(x)$$

- $2\pi = 360^\circ$
- 2π -Periodisch



α	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{5\pi}{4}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{7\pi}{4}$	$\frac{11\pi}{6}$	2π
α°	0°	30°	45°	60°	90°	120°	135°	150°	180°	210°	225°	240°	270°	300°	315°	330°	360°
$\sin \alpha$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{1}{2}$	0

$$Y = \sin(x)$$



○ $2\pi = 360^\circ$

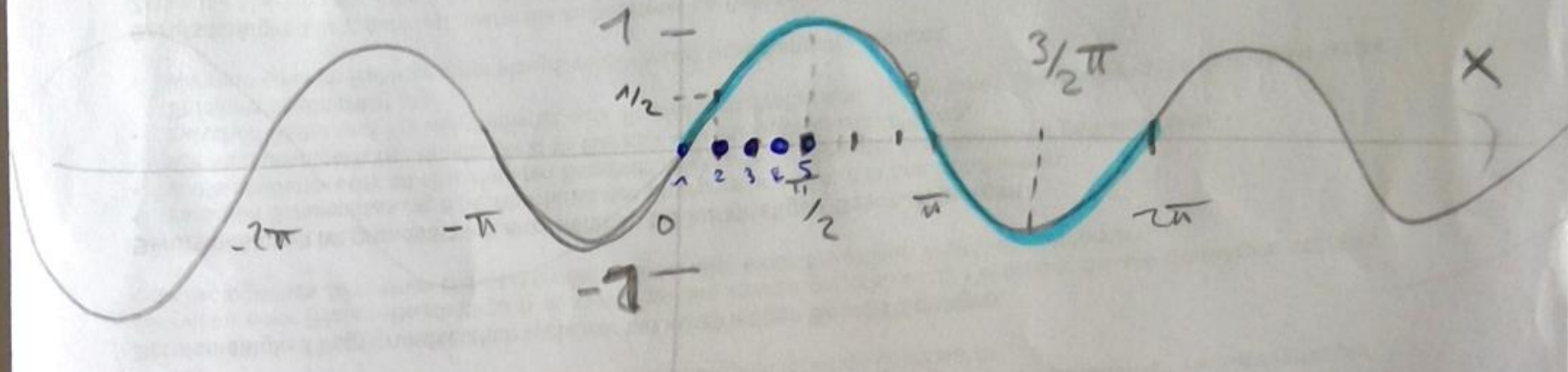
○ 2π -Periodisch

α	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{5\pi}{4}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{7\pi}{4}$	$\frac{11\pi}{6}$	2π
α°	0°	30°	45°	60°	90°	120°	135°	150°	180°	210°	225°	240°	270°	300°	315°	330°	360°
$\sin \alpha$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{1}{2}$	0

$Y = \sin(x)$

○ $2\pi * \frac{1}{a} = 360^\circ * \frac{1}{a}$

○ 2π -Periodisch



1. $\sin(0^\circ) = \sin\left(2\pi \cdot \frac{0}{360^\circ}\right) = 0$

2. $\sin(30^\circ) = \sin\left(2\pi \cdot \frac{30^\circ}{360^\circ}\right) = \sin\left(\frac{2\pi}{12}\right) = \sin\left(\frac{\pi}{6}\right) = \frac{1}{2}$

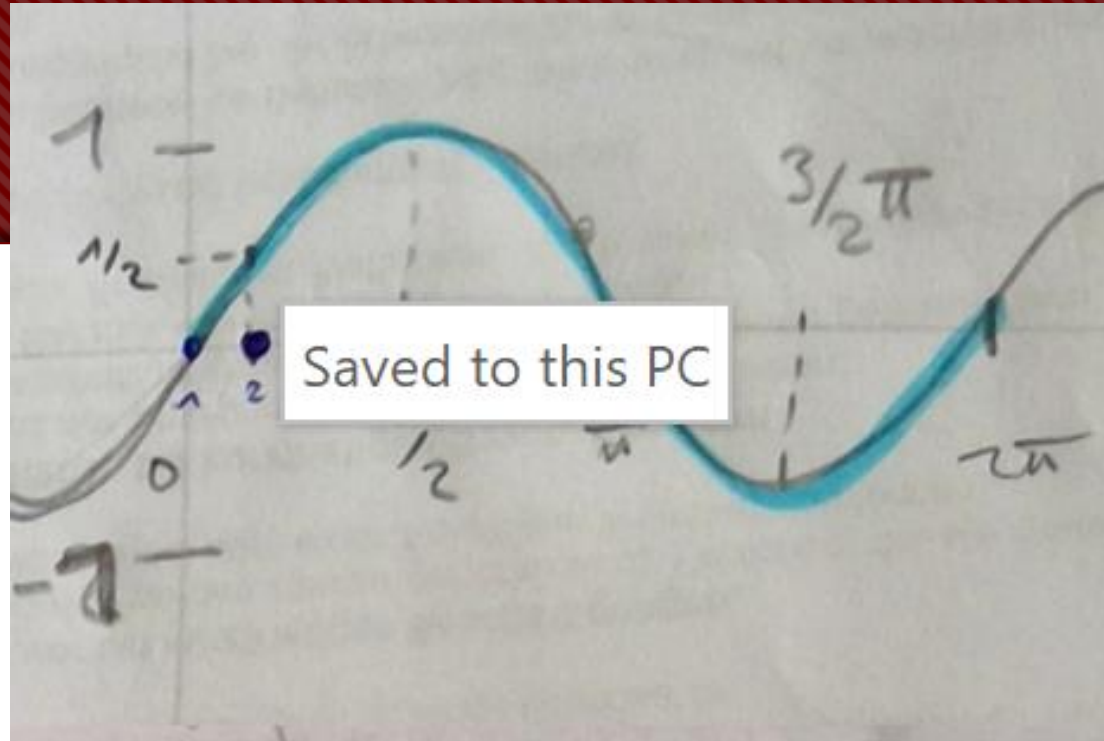
3. $\sin(45^\circ) = \sin\left(2\pi \cdot \frac{45^\circ}{360^\circ}\right) = \sin\left(\frac{2\pi}{8}\right) = \sin\left(\frac{\pi}{4}\right) = \frac{\sqrt{2}}{2}$

4. $\sin(60^\circ) = \sin\left(2\pi \cdot \frac{60^\circ}{360^\circ}\right) = \sin\left(\frac{2\pi}{6}\right) = \sin\left(\frac{\pi}{3}\right) = \frac{\sqrt{3}}{2}$

5. $\sin(90^\circ) = \sin\left(2\pi \cdot \frac{90^\circ}{360^\circ}\right) = \sin\left(\frac{2\pi}{4}\right) = \sin\left(\frac{\pi}{2}\right) = 1$

Y=Sin(x)

- $2\pi = 360^\circ$
- 2π -Periodisch



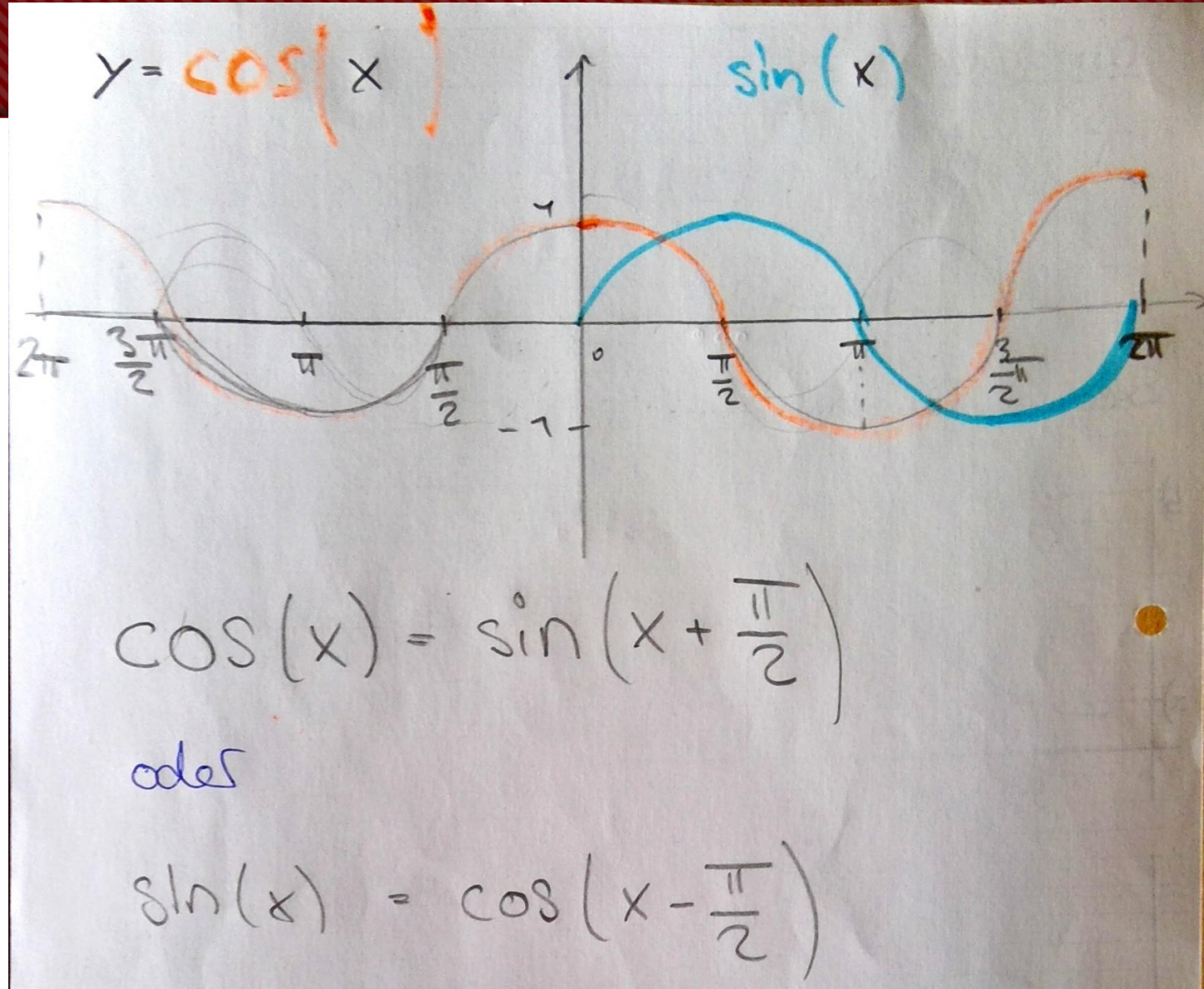
$$\begin{aligned} \sin\left(\frac{2\pi}{12}\right) &= \sin\left(\frac{\pi}{6}\right) = \frac{1}{2} \\ \sin\left(\frac{2\pi}{8}\right) &= \sin\left(\frac{\pi}{4}\right) = \frac{\sqrt{2}}{2} \\ &= \sin\left(\frac{2\pi}{6}\right) = \sin\left(\frac{\pi}{3}\right) = \frac{\sqrt{3}}{2} \\ \sin\left(\frac{2\pi}{4}\right) &= \sin\left(\frac{\pi}{2}\right) = 1 \end{aligned}$$

α	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{5\pi}{4}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{7\pi}{4}$	$\frac{11\pi}{6}$	2π
α°	0°	30°	45°	60°	90°	120°	135°	150°	180°	210°	225°	240°	270°	300°	315°	330°	360°
$\sin \alpha$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{1}{2}$	0

Zusammenhang von Sinus und Cosinus

- Gleiche Funktion, lediglich eine Verschiebung um 90°

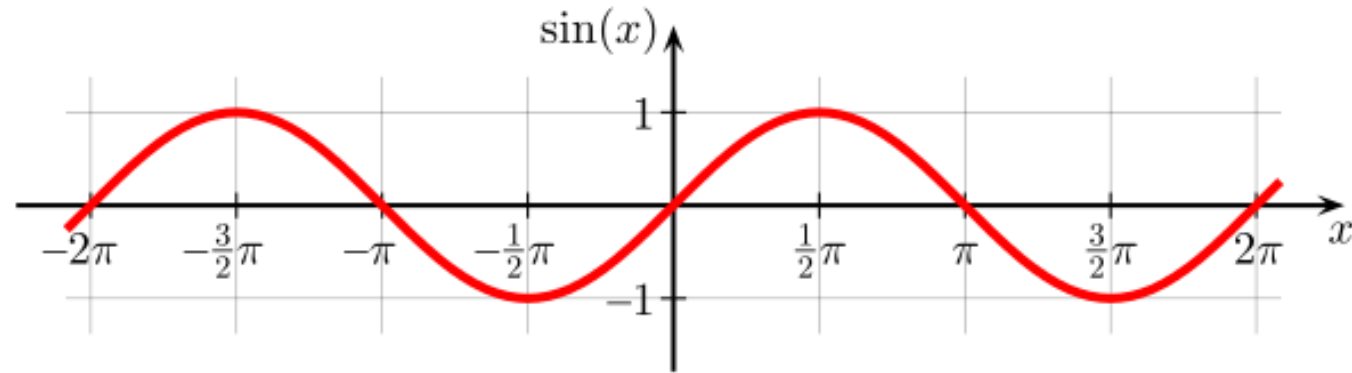
- $\cos(x) = \sin\left(x + \frac{\pi}{2}\right)$



Sinus und Cosinus

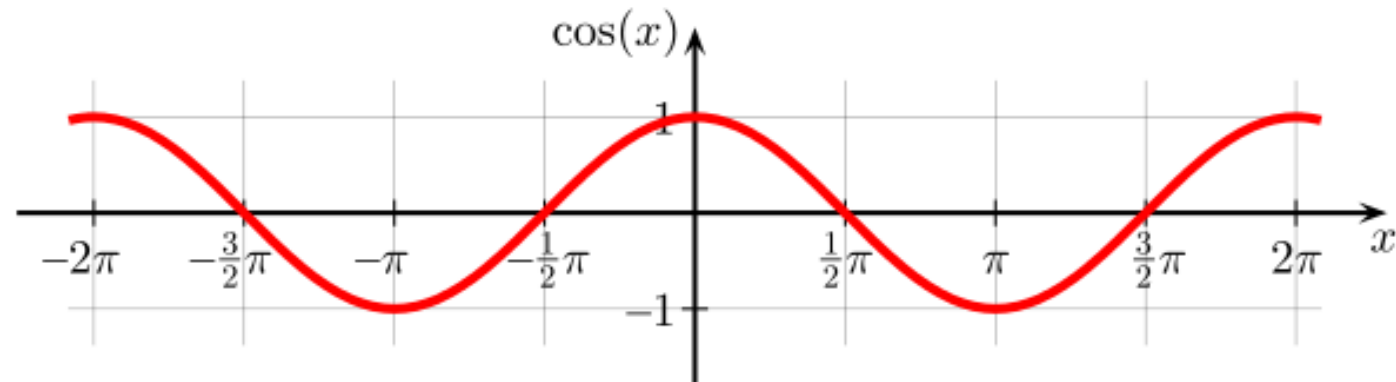
- Sinus ist Punktsymmetrisch

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



- Cosinus ist Spiegelsymmetrisch

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

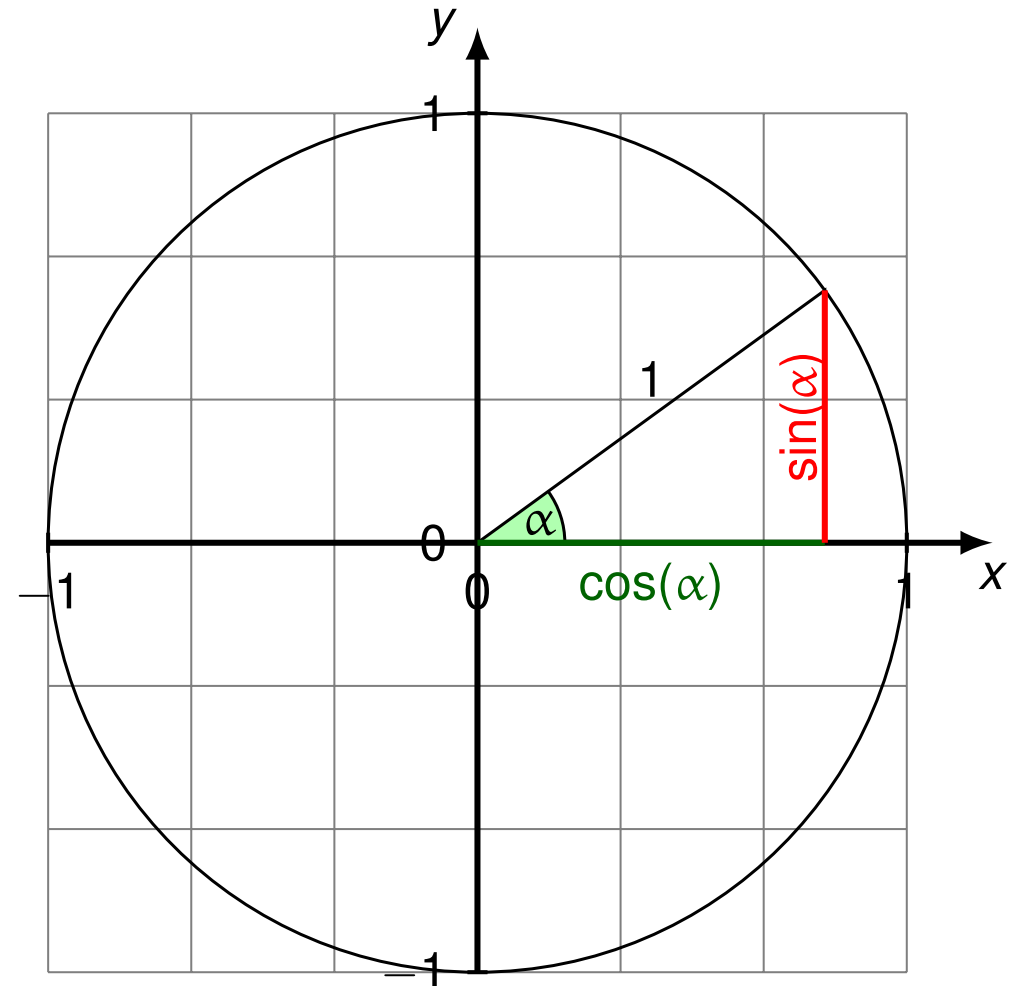


Pythagoras

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

Animation:

<https://www.youtube.com/watch?v=w-hXOYZ2gpo>



Wertetabelle

x	Winkel	$\sin(x)$	$\cos(x)$	$\sin(x)$	$\cos^2(x)$	$\sin^2(x)$
0	0°		1	0	1	0
0.5	30°		$\sqrt{3}/2$	$1/2$	$3/4$	$1/4$
1	45°		$\sqrt{2}/2 = \frac{1}{\sqrt{2}}$	$\sqrt{2}/2 = \frac{1}{\sqrt{2}}$	$1/2$	$1/2$
1.5	60°		$1/2$	$\sqrt{3}/2$	$1/4$	$3/4$
2	90°		0	1	0	1

Wertetabelle

α	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{5\pi}{4}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{7\pi}{4}$	$\frac{11\pi}{6}$	2π
α°	0°	30°	45°	60°	90°	120°	135°	150°	180°	210°	225°	240°	270°	300°	315°	330°	360°
$\sin \alpha$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{1}{2}$	0
$\cos \alpha$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{1}{2}$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
$\operatorname{tg} \alpha$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	-	$-\sqrt{3}$	-1	$-\frac{1}{\sqrt{3}}$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	-	$-\sqrt{3}$	-1	$-\frac{1}{\sqrt{3}}$	0
				1		1						1		1			

Trigonometrischer Zusammenhang

○ Lernspruch:

○ Sinus: SiCo CoSi

○ Cosinus: CoCo SiSi

$$\sin(x \pm y) = \sin x \cdot \cos y \pm \cos x \cdot \sin y$$

$$\cos(x \pm y) = \cos x \cdot \cos y \mp \sin x \cdot \sin y$$

Trigonometrischer Zusammenhang

Sinussatz: SICO \pm COSI

$$\sin(\underline{x} \pm \underline{y}) = \sin(\underline{x})\cos(\underline{y}) \pm \cos(\underline{x})\sin(\underline{y})$$

(positiv)

cosinussatz: COCO \mp SISI

$$\cos(\underline{x} \pm \underline{y}) = \cos(\underline{x})\cos(\underline{y}) \mp \sin(\underline{x})\sin(\underline{y})$$

CosinusSatz: CoCo SiSi

○ Wichtiger Zusammenhang:

○ $\cos(x + x) = \cos(x)\cos(x) - \sin(x)\sin(x)$

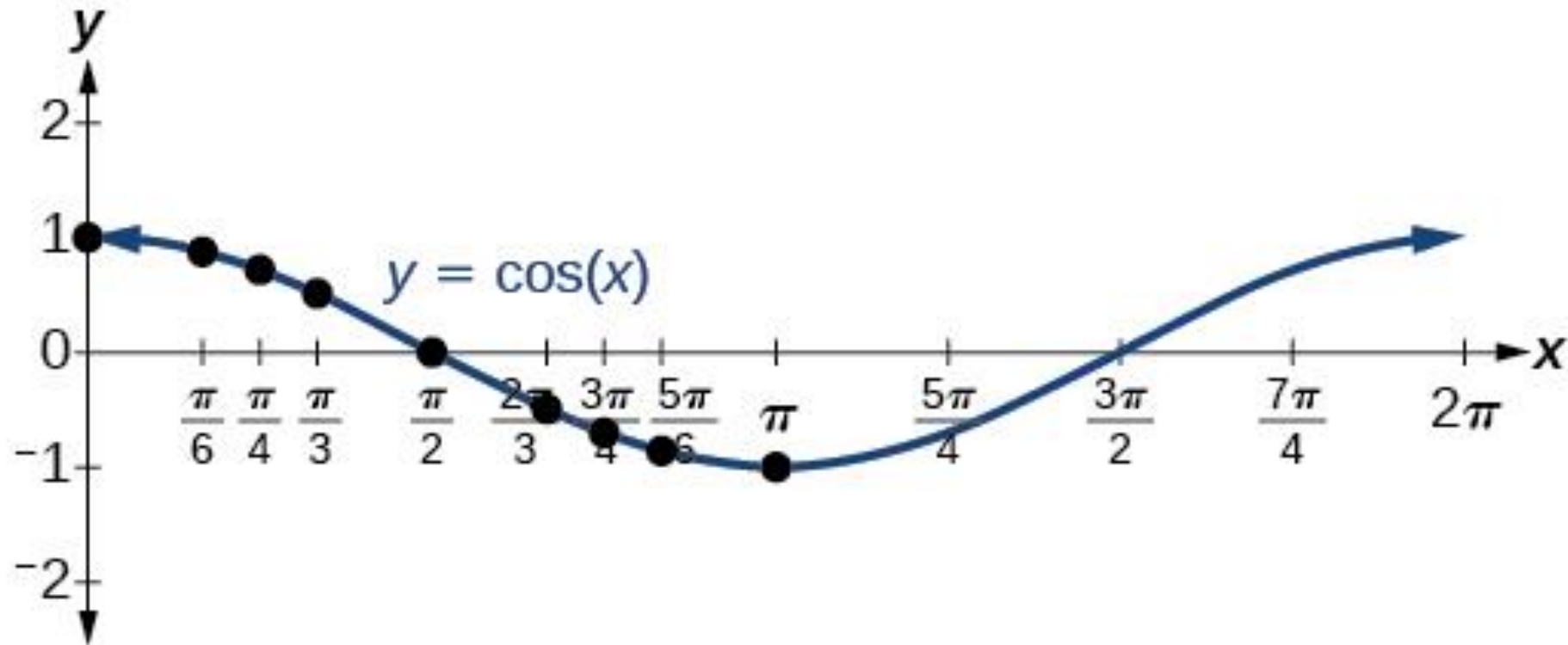
$$= \cos^2(x) - (1 - \cos^2(x))$$

$$= 2\cos^2(x) - 1$$

$$= 2(1 - \sin^2(x)) - 1$$

$$= 1 - 2\sin^2(x)$$

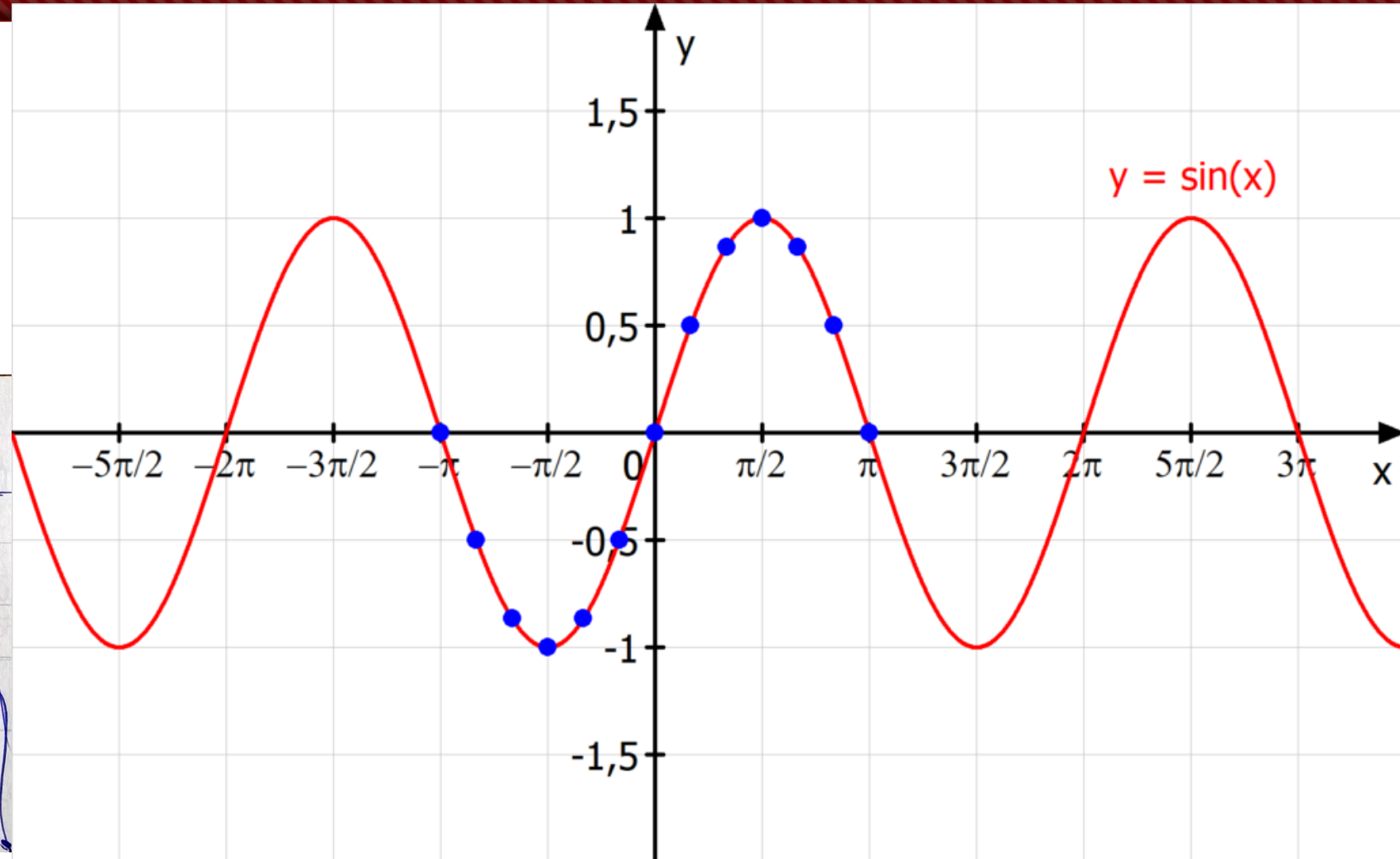
Welche werte hat Cos(x) an den Punkten



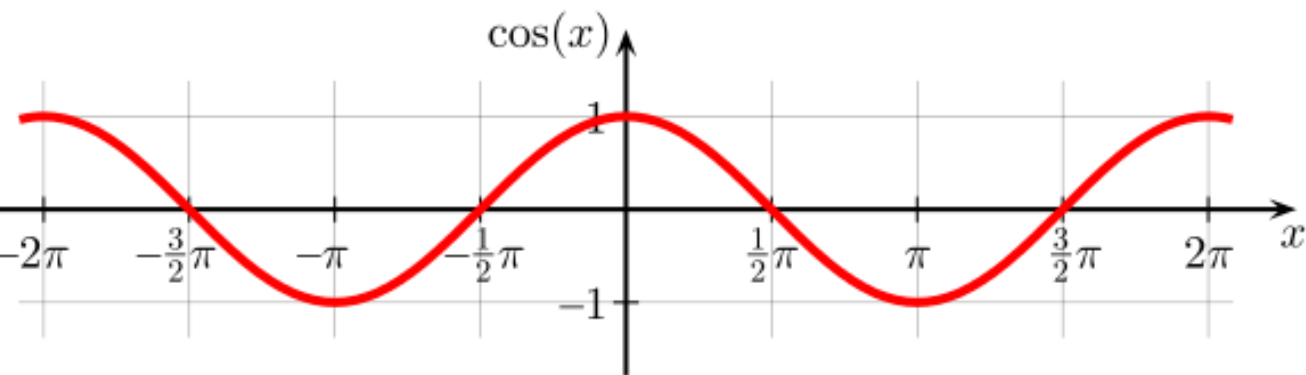
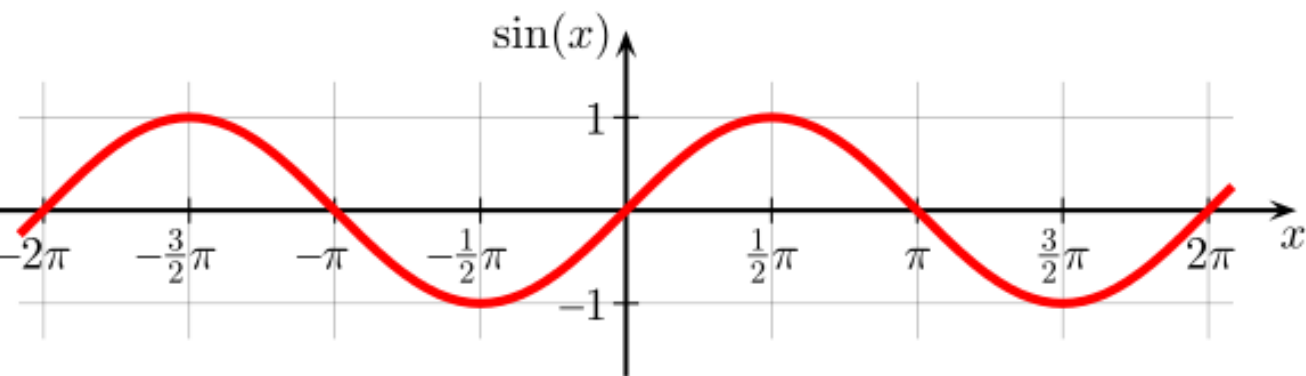
Welche werte hat x an den Punkten

- $x \in (-\pi, \pi)$
- $\sin(x) =$
- $-\frac{1}{2}; -\frac{\sqrt{3}}{2}, -1; 0; \frac{1}{2}; \frac{\sqrt{3}}{2};$

x	Winkel	$\sin(x)$	$\cos(x)$	$\sin(x)$
0	0°		1	0
1/6	30°		$\sqrt{3}/2$	$1/2$
1/4	45°		$\sqrt{2}/2 = \frac{1}{\sqrt{2}}$	$\sqrt{2}/2 = \frac{1}{\sqrt{2}}$
3/4	60°		$1/2$	$\sqrt{3}/2$
1/2	90°		0	1



Vervollständige die Tabelle



x	Winkel°	$\sin(x)$	$\cos(x)$	$\sin^2(x)$	$\cos^2(x)$	$\tan(x)$
0	0°	0	1	0		
$\pi/6$	30°	$1/2$		$1/4$		
$\pi/4$	45°	$\sqrt{2}/2$		$1/2$		
$\sqrt{3}/2$	60°	$\sqrt{3}/2$		$3/4$		
$\pi/2$	90°	1	0	1		-
<hr/>						
•	120°			$3/4$		
	135°			$2/4$		
	150°			$1/4$		
	180°	0	-1	0	1	0
	210°					
•	225°					
	240°					
		-1	0			
	300°					
	315°					
2π	330°					
		0	1			

Aufgaben aus München Mathematiktest_Sep_2016

c) $\sin(x) + \cos(x) = 1$

plot

d) $\cos\left(x - \frac{\pi}{2}\right) + \frac{\sqrt{3}}{2} = 0$

$\sin(x) = -\frac{\sqrt{3}}{2}$

Tabelle

e) $\sin(x) + \cos(x) = 0$

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

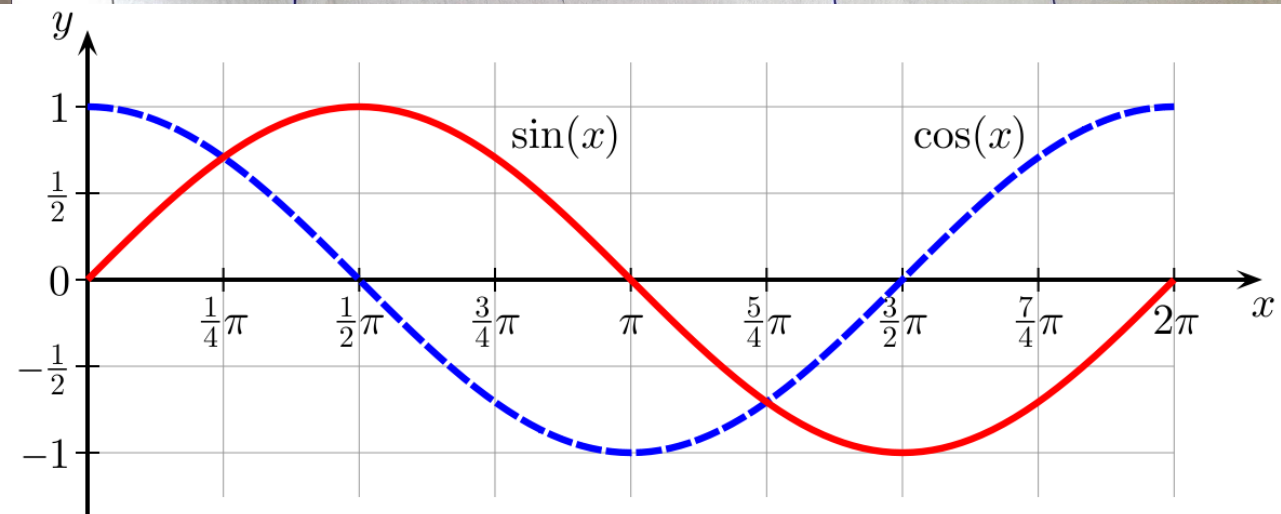
Tabelle

Graph

f) $\sin(x) - \cos(x) = 0$

Tabelle

x	Winkel	$\sin(x)$	$\cos(x)$	$\sin(x)$	$\cos^2(x)$	$\sin^2(x)$
0	0°		1	0	1	0
$\frac{\pi}{6}$	30°		$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{4}$
$\frac{\pi}{4}$	45°		$\frac{\sqrt{2}}{2} = \frac{1}{\sqrt{2}}$	$\frac{\sqrt{2}}{2} = \frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$\frac{1}{2}$
$\frac{\pi}{3}$	60°		$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{4}$	$\frac{3}{4}$
$\frac{\pi}{2}$	90°		0	1	0	1



Aufgaben aus München Mathematiktest_Sep_2016

g) $\sin^2(x) + \cos(x) = 1$

h) $\sin x + \cos(2x) = 1$

Neue Wk
oder P

x	Winkel $\sin(x)$	$\cos(x)$	$\sin(x)$	$\cos^2(x)$	$\sin^2(x)$
0	0°	1	0	1	0
$\frac{\pi}{6}$	30°	$\sqrt{3}/2$	$1/2$	$3/4$	$1/4$
$\frac{\pi}{4}$	45°	$\sqrt{2}/2 = \frac{1}{\sqrt{2}}$	$\sqrt{2}/2 = \frac{1}{\sqrt{2}}$	$1/2$	$1/2$
$\frac{\pi}{3}$	60°	$1/2$	$\sqrt{3}/2$	$1/4$	$3/4$
$\frac{\pi}{2}$	90°	0	1	0	1

0°	0	1	✓
15°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	✓
30°	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	✓
45°	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	
60°	1	0	
75°			
90°			
105°			
120°			
135°			
150°			
165°			
180°			
195°			
210°			
225°			
240°			
255°			
270°			
285°			
300°			
315°			
330°			
345°			
360°			

Aufgaben aus München Mathematiktest_Sep_2016

g) $\sin^2(x) + \cos(x) = 1$

h) $\sin x + \cos(2x) = 1$

Neue Wk
oder P

x	Winkel $\sin(x)$	$\cos(x)$	$\sin(x)$	$\cos^2(x)$	$\sin^2(x)$
0	0°	1	0	1	0
$\frac{\pi}{6}$	30°	$\sqrt{3}/2$	$1/2$	$3/4$	$1/4$
$\frac{\pi}{4}$	45°	$\sqrt{2}/2 = \frac{1}{\sqrt{2}}$	$\sqrt{2}/2 = \frac{1}{\sqrt{2}}$	$1/2$	$1/2$
$\frac{\pi}{3}$	60°	$1/2$	$\sqrt{3}/2$	$1/4$	$3/4$
$\frac{\pi}{2}$	90°	0	1	0	1

0°	0	1	✓
15°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	✓
30°	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	✓
45°	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	
60°	1	0	
75°			
90°			
105°			
120°			
135°			
150°			
165°			
180°			
195°			
210°			
225°			
240°			
255°			
270°			
285°			
300°			
315°			
330°			
345°			
360°			

Aufgaben aus München Mathematiktest_Sep_2016

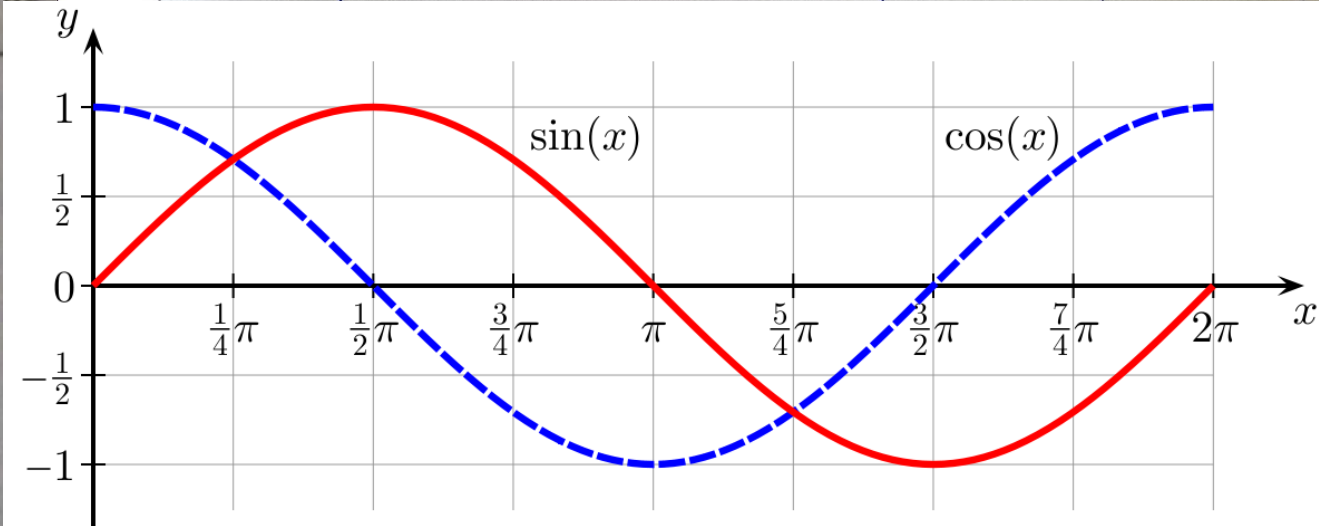
g) $\sin^2(x) + \cos(x) = -1$

h) $\sin x + \cos(2x) = 1$

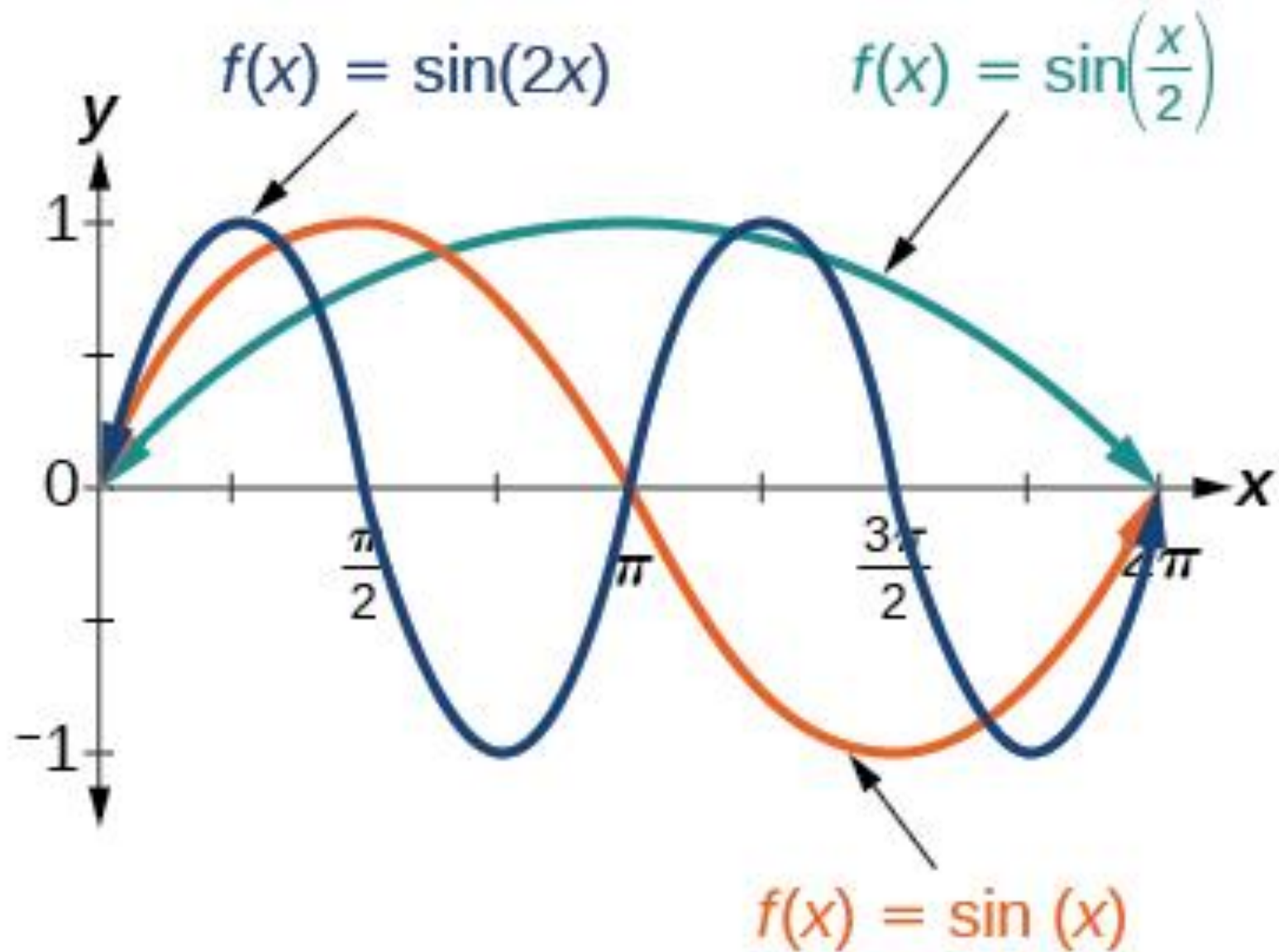
Neue Werte
oder

0°	0	1
15°	1/2	√3/2
30°	1/2	√3/2
45°	√2/2	√2/2
60°	√3/2	1/2
75°	1	1/2
90°	1	0
105°	1	1/2
120°	1/2	√3/2
135°	1/2	√3/2
150°	1/2	√3/2
165°	1/2	√3/2
180°	0	1
195°	0	1
210°	1/2	√3/2
225°	1/2	√3/2
240°	1/2	√3/2
255°	1/2	√3/2
270°	0	1
285°	0	1
300°	1/2	√3/2
315°	1/2	√3/2
330°	1/2	√3/2
345°	1/2	√3/2
360°	0	1

x	Winkel	sin(x)	cos(x)	sin(x)	cos²(x)	sin²(x)
0	0°		1	0	1	0
π/6	30°		√3/2	1/2	3/4	1/4
π/4	45°		√2/2 = 1/√2	√2/2 = 1/√2	1/2	1/2
π/3	60°		1/2	√3/2	1/4	3/4
π/2	90°		0	1	0	1



Plots



Aufgaben

x	Winkel sin(x)	cos(x)	sin(x)	cos ² (x)	sin ² (x)
0	0°	1	0	1	0
$\frac{\pi}{6}$	30°	$\sqrt{3}/2$	$1/2$	$3/4$	$1/4$
$\frac{\pi}{4}$	45°	$\sqrt{2}/2 = \frac{1}{\sqrt{2}}$	$\sqrt{2}/2 = \frac{1}{\sqrt{2}}$	$1/2$	$1/2$
$\frac{2}{3}\pi$	60°	$1/2$	$\sqrt{3}/2$	$1/4$	$3/4$
$\frac{\pi}{2}$	90°	0	1	0	1

i) $\sin(2x) + 2\cos^2 x = 2$

$$2\cos(x)\sin(x) + 2\cos^2(x) = 2$$

$$\cos(x)\sin(x) + \cos^2(x) = 1 \quad \text{oder} \quad \text{tabelle}$$

$$a) \sin x \cos x = -\frac{\sqrt{3}}{4}$$

$$\frac{1}{2} \sin(2x) = -\frac{\sqrt{3}}{4}$$

Für Tabelle substituieren $2x = z$

$$\sin(z) = -\frac{\sqrt{3}}{2}$$

Werte ablesen oder kennen $z \in \left\{ \begin{matrix} 240^\circ, 300^\circ \\ +2\pi, +2\pi \end{matrix} \right\}$

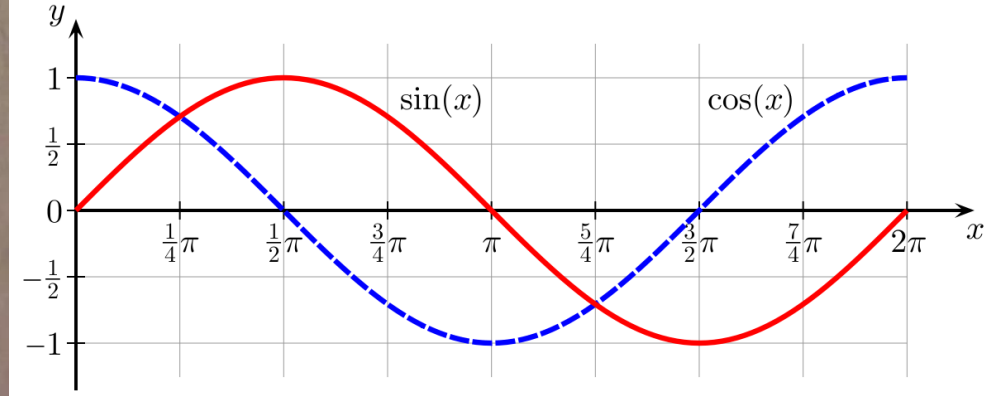
Resubstituieren

2π -periodisch

$$x_{1,\dots} = \frac{z_{1,\dots}}{2}$$

$$x \in \left\{ 120^\circ, 150^\circ, 120^\circ + 180^\circ, 150^\circ + 180^\circ \right\}$$

$$x \in \{ 120^\circ, 150^\circ, 300^\circ, 330^\circ \}$$



x	Winkel sin(x)	cos(x)	sin(x)	cos(x)
0/1/0	0°	1	0	1
1/4	30°	$\sqrt{3}/2$	$1/2$	$3/4$
2/4	45°	$\sqrt{2}/2 = \frac{1}{\sqrt{2}}$	$\sqrt{2}/2 = \frac{1}{\sqrt{2}}$	$1/2$
3/4	60°	$1/2$	$\sqrt{3}/2$	$1/4$
2/1/1	90°	0	1	0

$$k) \quad 1 + \cos(2x) = \cos(x)$$

~~Neue~~ Werte tabelle

$$\cos(x) - \cos(2x) = 1$$

oder

$$\text{oder} \quad \cos(x) - (2\cos^2 x - 1) = 1 \quad (\Rightarrow) \quad \frac{\cos x}{2} + \cos^2(x) = 0$$

$$k) \quad \frac{\cos x}{2} = \cos^2(x)$$

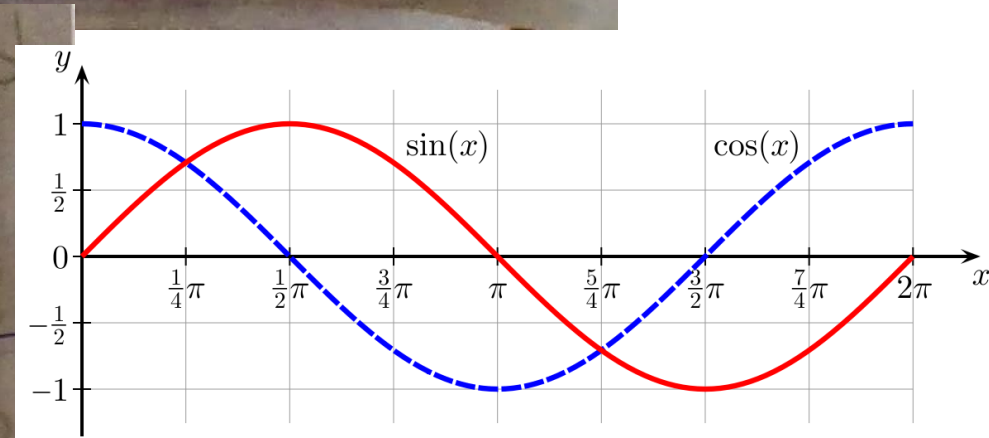
$$\left[\text{oder} \quad \frac{1}{2} = \cos(x) \right] \text{ aber vorsteht!}$$

$$60^\circ \rightarrow \cos(60^\circ) = \frac{1}{2}$$

$$\left. \begin{array}{l} 90^\circ \\ 270^\circ \end{array} \right\} \cos(x) = 0$$

$$300^\circ \rightarrow \cos(300^\circ) = \frac{1}{2}$$

man verliert die
Lösungen
für $\cos(x) = 0$



$$1) \quad 4\cos^2 x - 3 = 0$$

$$\cos^2 x = 3/4$$

Tabelle
mit

oder

$$|\cos(x)| = \sqrt{3}/2$$

Betrag
sonst verteil man
Lösungen

Tabelle $\rightarrow 30^\circ$

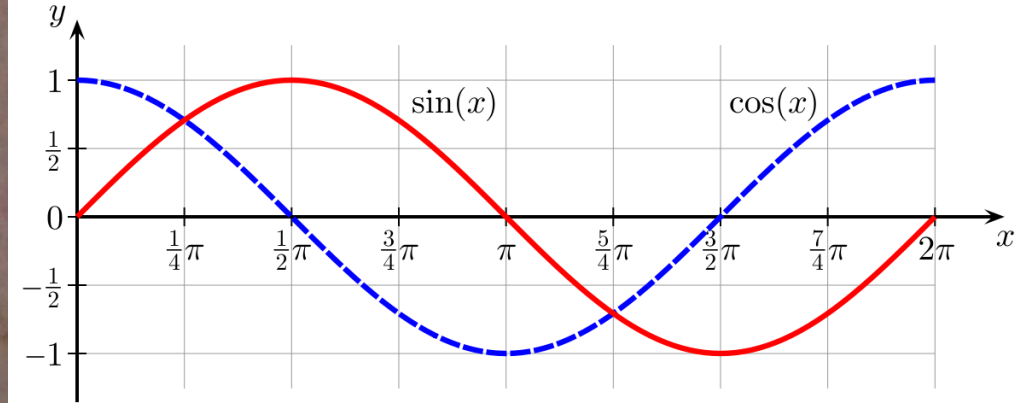
+
Plot

~~$90^\circ - 30^\circ$~~ $180^\circ - 30^\circ$

$180^\circ + 30^\circ$

~~30°~~ $360^\circ - 30^\circ$

$$x \in \{30^\circ, 150^\circ, 210^\circ, 330^\circ\}$$



x	Winkel $\sin(x)$	$\cos(x)$	$\sin(x)$	$\cos^2(x)$	$\sin^2(x)$
0	0°	1	0	1	0
$\pi/6$	30°	$\sqrt{3}/2$	$1/2$	$3/4$	$1/4$
$\pi/4$	45°	$\sqrt{2}/2 = \frac{1}{\sqrt{2}}$	$\sqrt{2}/2 = \frac{1}{\sqrt{2}}$	$1/2$	$1/2$
$\pi/3$	60°	$1/2$	$\sqrt{3}/2$	$1/4$	$3/4$
$\pi/2$	90°	0	1	0	1

$$m) \sin^2 x + \cos x = 1,25$$

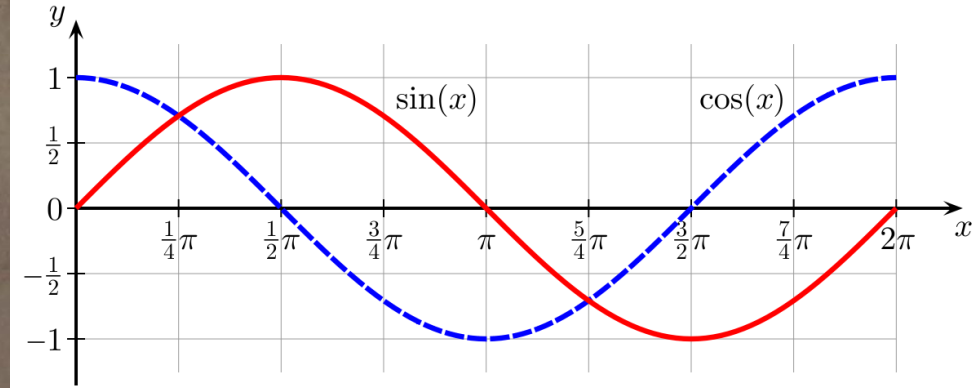
$$\sin^2 x + \cos x = \frac{5}{4}$$

Wertetabelle,
+ plot

$$L_1 \quad x = 60^\circ$$

$$L_2 \quad x = 360^\circ - 60^\circ$$

$$x \in \{60^\circ, 300^\circ\}$$



$$n) \sin^2 x = 3 \cos^2 x \quad \wedge x \in \mathbb{R}$$

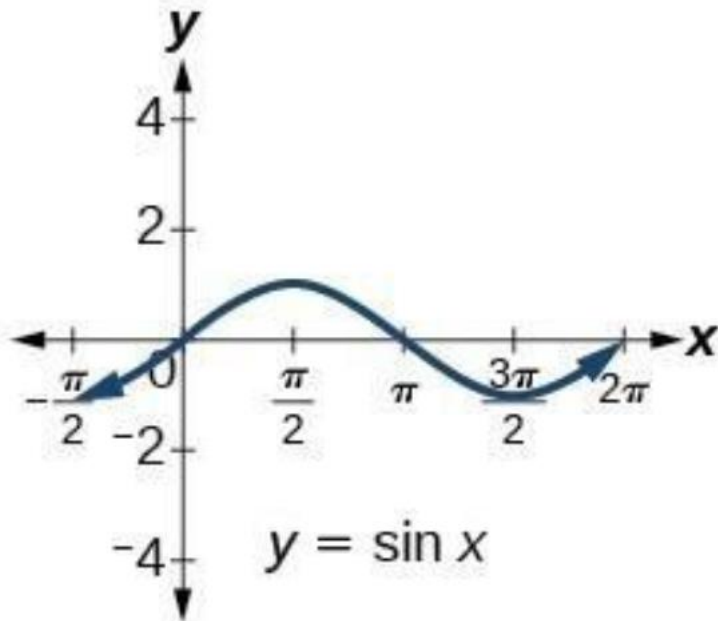
$$\frac{\sin^2 x}{\cos^2 x} = 3$$

Wertetabelle

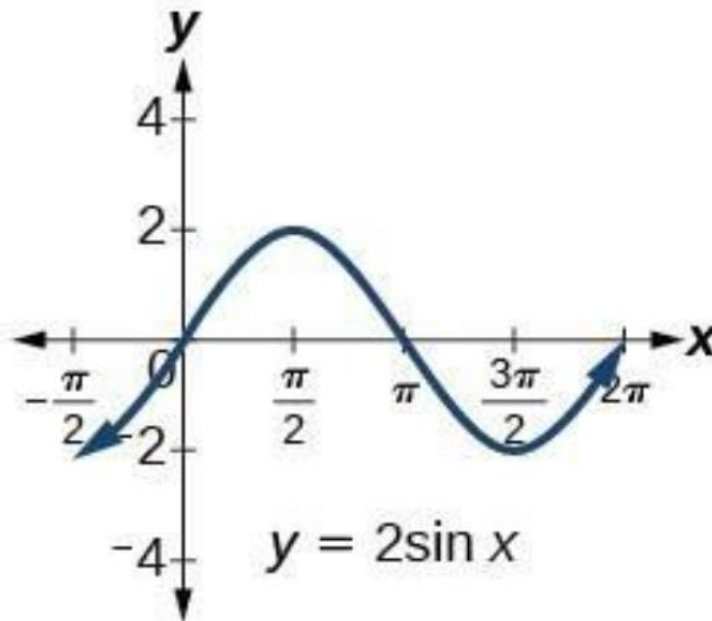
$$\left(\tan^2 x = 3 \right)$$

x	Winkel sin(x)	cos(x)	sin(x)	cos ² (x)	sin ² (x)
0	0°	1	0	1	0
1/6π	30°	√3/2	1/2	3/4	1/4
1/4π	45°	√2/2 = 1/√2	√2/2 = 1/√2	1/2	1/2
1/3π	60°	1/2	√3/2	1/4	3/4
1/2π	90°	0	1	0	1

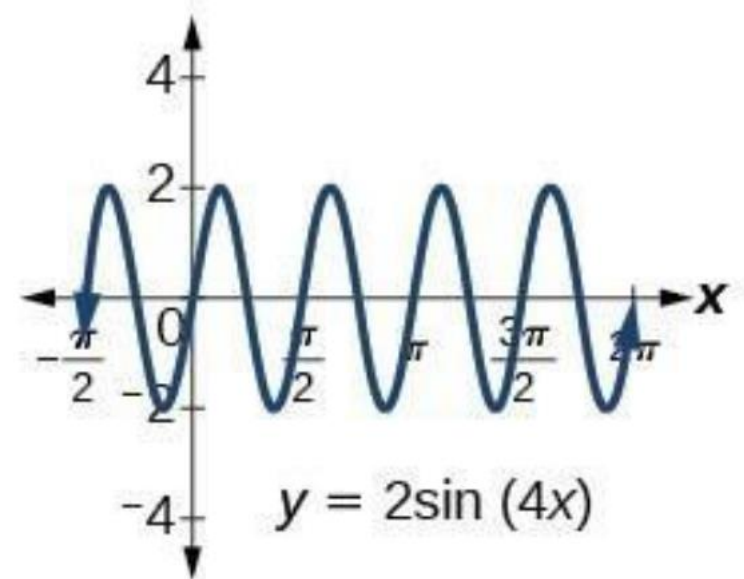
Veränderung der Periode oder Amplitude



(a)



(b)



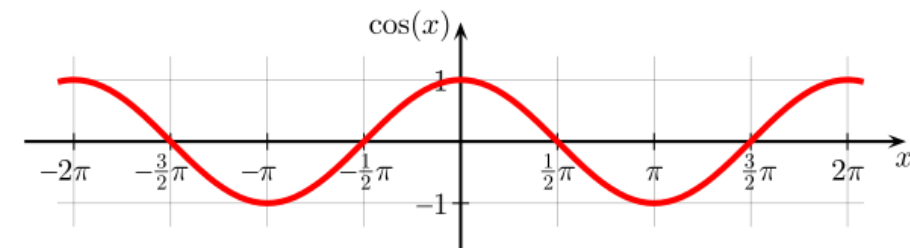
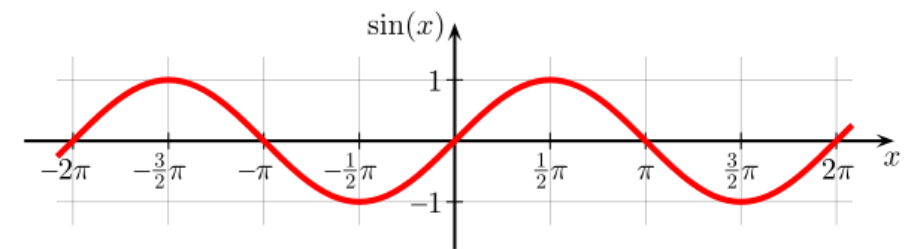
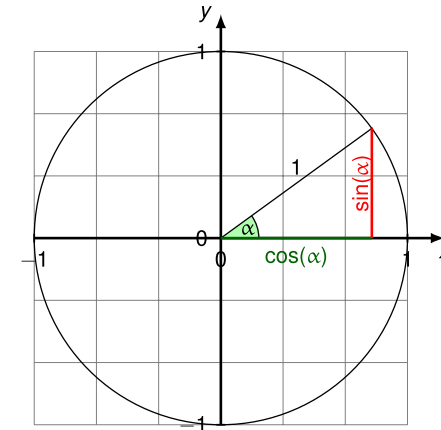
(c)

Wichtigsten Zusammenhänge

$$\sin^2(\alpha) = 1 - \cos^2(\alpha)$$

Wertetabelle :

Winkel in Grad	0°	30°	45°	60°	90°	180°	270°	360°
Winkel in Bogenmaß	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	π	$\frac{3}{2}\pi$	2π
$\sin \alpha = y$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	0	-1	0
$\cos \alpha = x$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	-1	0	1



Trigonometrischer Zusammenhang

○ Lernspruch:

○ Sinus: SiCo CoSi

○ Cosinus: CoCo SiSi

$$\sin(x \pm y) = \sin x \cdot \cos y \pm \cos x \cdot \sin y$$

$$\cos(x \pm y) = \cos x \cdot \cos y \mp \sin x \cdot \sin y$$

Trigonometrischer Zusammenhang

Sinussatz: SICO \pm COSI

$$\sin(\underline{x} \pm \underline{y}) = \sin(\underline{x})\cos(\underline{y}) \pm \cos(\underline{x})\sin(\underline{y})$$

(positiv)

cosinussatz: COCO \mp SISI

$$\cos(\underline{x} \pm \underline{y}) = \cos(\underline{x})\cos(\underline{y}) \mp \sin(\underline{x})\sin(\underline{y})$$

CosinusSatz: CoCo SiSi

○ Wichtiger Zusammenhang:

$$\textcircled{\text{red}} \cos(x + x) = \cos(x)\cos(x) - \sin(x)\sin(x)$$

$$= \cos^2(x) - (1 - \cos^2(x))$$

$$= 2\cos^2(x) - 1$$

$$= 2(1 - \sin^2(x)) - 1$$

$$= 1 - 2\sin^2(x)$$