

## Umformungen mit Sinus, Kosinus und Tangens – Lösung

1. a)  $\cos 165^\circ = -\cos(180^\circ - 165^\circ) = -\cos 15^\circ$   
 b)  $\sin 275^\circ = -\sin(360^\circ - 275^\circ) = -\sin 85^\circ$   
 c)  $\sin(-112^\circ) = -\sin 112^\circ = -\sin 68^\circ$   
 d)  $\cos(-63^\circ) = \cos 63^\circ$   
 e)  $\sin(-194^\circ) = -\sin 194^\circ = \sin 14^\circ$   
 f)  $\cos 315^\circ = \cos(360^\circ - 315^\circ) = \cos 45^\circ = \frac{1}{2}\sqrt{2}$   
 g)  $\sin 293^\circ = -\sin(360^\circ - 293^\circ) = -\sin 67^\circ$   
 h)  $\sin 197^\circ = -\sin 17^\circ$   
 i)  $\cos 183^\circ = -\cos 3^\circ$   
 k)  $-\sin 215^\circ = \sin 35^\circ$   
 l)  $\cos(-83^\circ) = \cos 83^\circ$   
 m)  $-\cos 161^\circ = \cos 161^\circ = -\cos 19^\circ$   
 n)  $\sin 253^\circ = -\sin 73^\circ$   
 o)  $\sin(-111^\circ) = -\sin 111^\circ = -\sin 69^\circ$   
 p)  $\cos 344^\circ = \cos 16^\circ$
2. a)  $\cos 65^\circ = \sin 25^\circ = \sin 155^\circ$   
 b)  $\sin 275^\circ = -\sin 95^\circ$   
 c)  $\sin 12^\circ = \sin 168^\circ$
3. a)  $\cos 140^\circ + \sin 50^\circ = -\cos 40^\circ + \sin 50^\circ = -\cos 40^\circ + \cos 40^\circ = 0$   
 b)  $\sin 280^\circ - \cos 170^\circ = -\sin 80^\circ + \cos 10^\circ = -\sin 80^\circ + \sin 80^\circ = 0$
4. a)  $\sin 75^\circ + \cos 345^\circ - \cos 165^\circ = \sin 75^\circ + \cos 15^\circ + \cos 15^\circ = 3 \cos 15^\circ$   
 b)  $\sin 300^\circ - \cos 150^\circ + 2 \cos 330^\circ = -\sin 60^\circ + \cos 30^\circ + 2 \cos 30^\circ = 2 \cos 30^\circ = \sqrt{3}$   
 c)  $\cos \alpha \cdot \tan \alpha = \sin \alpha$
5. a)  $\frac{(\sin 35^\circ)^2 + (\cos 145^\circ)^2}{\sin 30^\circ} = \frac{(\sin 35^\circ)^2 + (\cos 35^\circ)^2}{\sin 30^\circ} = \frac{1}{0,5} = 2$   
 b)  $\frac{\cos 45^\circ}{(\cos 17^\circ)^2 + (\sin 163^\circ)^2} = \frac{\cos 45^\circ}{(\cos 17^\circ)^2 + (\sin 17^\circ)^2} = \frac{\cos 45^\circ}{1} = \frac{1}{2}\sqrt{2}$   
 c)  $\frac{\sqrt{1 - (\cos \alpha)^2}}{\cos \alpha} + \tan \alpha = \frac{\sqrt{(\sin \alpha)^2}}{\cos \alpha} + \tan \alpha = \frac{\sin \alpha}{\cos \alpha} + \tan \alpha = 2 \tan \alpha$

6. a)  $\sin \alpha = 0,5$ ;  $L = \{30^\circ; 150^\circ; 390^\circ; 510^\circ\}$   
 b)  $\cos \alpha = 0,5$ ;  $L = \{-60^\circ; 60^\circ; 300^\circ; 420^\circ\}$   
 c)  $\cos 2\alpha = -1$ ;  $L = \{-90^\circ; 90^\circ; 270^\circ\}$  (Achtung: Werte werden mit 2 multipliziert)  
 d)  $\sin \alpha = -\frac{1}{2}\sqrt{3}$ ;  $L = \{-120^\circ; -60^\circ; 240^\circ; 300^\circ\}$   
 e)  $\cos \alpha = \frac{1}{2}\sqrt{3}$ ;  $L = \{-30^\circ; 30^\circ; 330^\circ; 390^\circ\}$   
 f)  $1 - \tan \alpha = 0$ ;  $L = \{-135^\circ; 45^\circ; 225^\circ; 405^\circ\}$

7. a)  $\cos \frac{3\pi}{4} = -\cos \frac{1\pi}{4} = -\frac{1}{2}\sqrt{2}$   
 b)  $\sin \frac{8\pi}{6} = \sin \frac{4\pi}{3} = -\sin \frac{\pi}{3} = -\frac{1}{2}\sqrt{3}$   
 c)  $\cos \frac{3\pi}{2} = 0$   
 d)  $\sin \frac{7\pi}{6} = -\sin \frac{\pi}{6} = -\frac{1}{2}$   
 e)  $\cos \frac{\pi}{6} = \frac{1}{2}\sqrt{3}$   
 f)  $\sin \frac{7\pi}{4} = -\sin \frac{\pi}{4} = -\frac{1}{2}\sqrt{2}$   
 g)  $\cos\left(-\frac{13}{6}\pi\right) = \cos\left(-\frac{1}{6}\pi\right) = \cos \frac{1}{6}\pi = \frac{1}{2}\sqrt{3}$   
 h)  $\sin 585^\circ = \sin 225^\circ = -\frac{1}{2}\sqrt{2}$   
 k)  $\sin \frac{11}{4}\pi = \sin \frac{3}{4}\pi = \sin \frac{1}{4}\pi = \frac{1}{2}\sqrt{2}$   
 l)  $\cos 690^\circ = \cos 330^\circ = \cos 30^\circ = \frac{1}{2}\sqrt{3}$   
 m)  $\cos \frac{10}{3}\pi = \cos \frac{4}{3}\pi = -\cos \frac{1}{3}\pi = -\frac{1}{2}$   
 n)  $\sin\left(-\frac{13}{2}\pi\right) = \sin\left(-\frac{1}{2}\pi\right) = -\sin\left(\frac{1}{2}\pi\right) = -1$

8. a)  $\sin x = 0,5$ ;  $L = \left\{\frac{\pi}{6}; \frac{5\pi}{6}; \frac{13\pi}{6}; \frac{17\pi}{6}\right\}$   
 b)  $\cos x = -\frac{1}{2}\sqrt{3}$ ;  $L = \left\{-\frac{5\pi}{6}; \frac{5\pi}{6}; \frac{7\pi}{6}; \frac{17\pi}{6}\right\}$   
 c)  $\cos x = \frac{1}{2}\sqrt{2}$ ;  $L = \left\{-\frac{\pi}{4}; \frac{\pi}{4}; \frac{7\pi}{4}; \frac{9\pi}{4}\right\}$   
 d)  $\sin x = 1$ ;  $L = \left\{\frac{\pi}{2}; \frac{5\pi}{2}\right\}$   
 e)  $\sin x = -\frac{1}{2}\sqrt{2}$ ;  $L = \left\{-\frac{3\pi}{4}; -\frac{\pi}{4}; \frac{5\pi}{4}; \frac{7\pi}{4}\right\}$   
 f)  $\sin 2x = 1$ ;  $L = \left\{-\frac{3\pi}{4}; \frac{\pi}{4}; \frac{5\pi}{4}; \frac{9\pi}{4}\right\}$