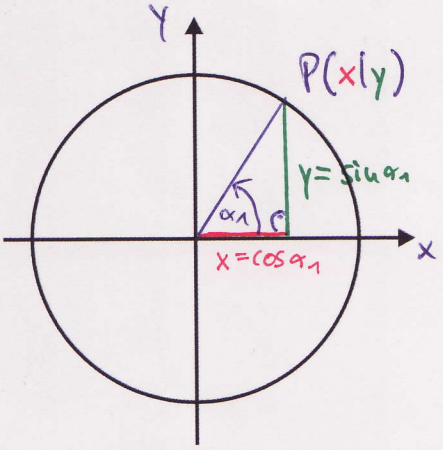
2.2 Winkelfunktionen für Winkel über 90°

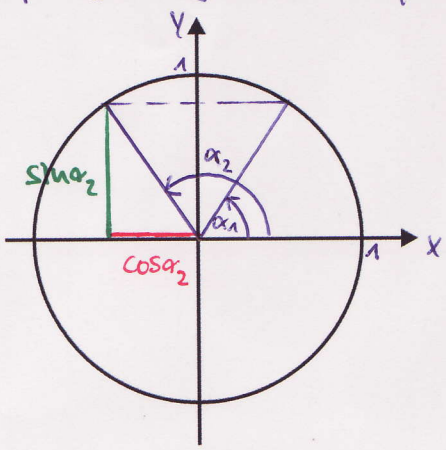
①



$x = \cos\alpha_1$

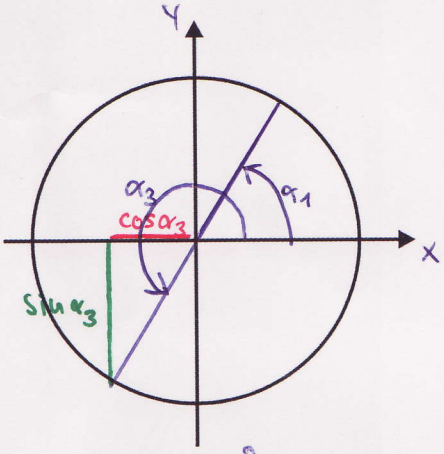
$y = \sin\alpha_1$

② Spiegelung an der y-Achse



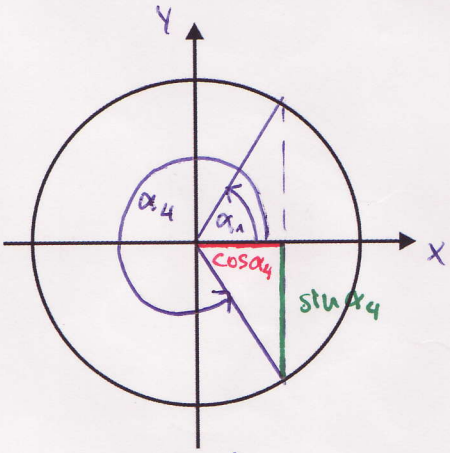
$\alpha_2 = 180° - \alpha_1$

③ Punktspiegelung am Ursprung



$\alpha_3 = 180° + \alpha_1$

④ Spiegelung an der x-Achse



$\alpha_4 = 360° - \alpha_1$

Aus der geometrischen Anordnung erkennt man:

$\sin(180° - \alpha_1) = \sin\alpha_1$

$\cos(180° - \alpha_1) = -\cos\alpha_1$

$\Rightarrow \tan(180° - \alpha_1) = -\frac{\sin\alpha_1}{\cos\alpha_1} = -\tan\alpha_1$ } ②

$\sin(180° + \alpha_1) = -\sin\alpha_1$

$\cos(180° + \alpha_1) = -\cos\alpha_1$

$\Rightarrow \tan(180° + \alpha_1) = \tan\alpha_1$ } ③

$\sin(360° - \alpha_1) = -\sin\alpha_1$

$\cos(360° - \alpha_1) = \cos\alpha_1$

$\Rightarrow \tan(360° - \alpha_1) = -\tan\alpha_1$ } ④