

# Treningsoppgaver.

Hvordan 3.1 - 3.5 brukes til å løse trigonometriske ligninger.

1)

$$3 \cos(2x) + 1 = 2, \quad x \in [0, 2\pi)$$

Lager trigonometrisk grunnligning (3.2):

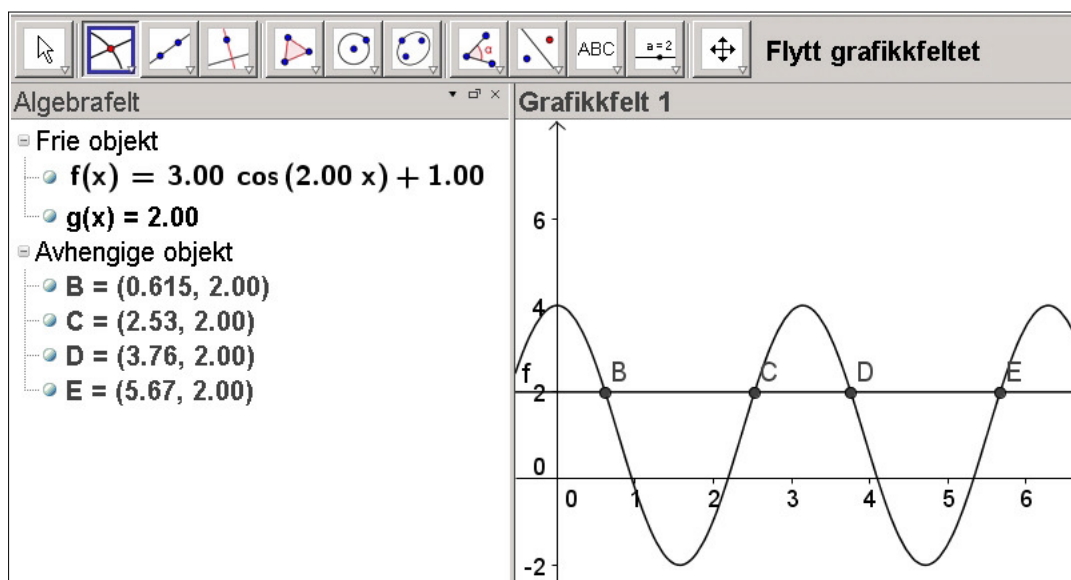
$$\cos(2x) = \frac{1}{3}$$

$$2x = 1.231 + k2\pi \vee 2x = 2\pi - 1.231 + k2\pi \quad (70.5^\circ \text{ og } 360^\circ - 70.5^\circ)$$

$$x = 0.6155 + k\pi \vee x = \frac{2\pi - 1.231}{2} + k\pi$$

$$L = \{0.616, 2.53, 3.76, 5.67\}$$

Kontroll med GeoGebra:



2)

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

Viktig eksempel, ikke glem faktorisering med felles faktor i ligningsløsning!

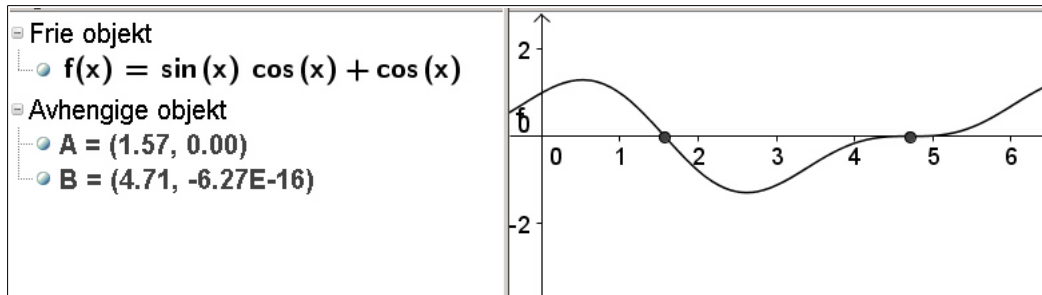
$$\cos(x)(\sin x + 1) = 0, \quad x \in [0, 2\pi)$$

$$\cos x = 0 \vee \sin x = -1$$

$$x = \frac{\pi}{2} + k\pi \vee x = \frac{3\pi}{2} + k2\pi$$

$$L = \left\{ \frac{\pi}{2}, \frac{3\pi}{2} \right\} \approx \{1.57, 4.71\}$$

Kontroll med GeoGebra:



3)

$$\sin(x) + \cos(x) = 0, \quad x \in [0, 2\pi)$$

$\cos(x) = 0$  gir ingen løsning da  $\sin x$  og  $\cos x$  aldri er null samtidig.

$$\cos(x) \neq 0 :$$

$$\frac{\sin x}{\cos x} + \frac{\cos x}{\cos x} = 0 \Leftrightarrow \tan x + 1 = 0 \Leftrightarrow \tan x = -1$$

$$x = -\frac{\pi}{4} + k\pi$$

$$L = \left\{ \frac{3\pi}{4}, \frac{7\pi}{4} \right\} \approx \{2.36, 5.50\}$$

4)

$$\tan^2 x - \tan x - 2 = 0, \quad x \in [0, 2\pi)$$

$$u^2 - u - 2 = 0, \quad u = \tan x$$

$$u = 2 \vee u = -1$$

$$\tan x = 2 \vee \tan x = -1$$

$$x = 1.107 + k\pi \vee x = -\frac{\pi}{4} + k\pi$$

$$L = \left\{ 1.11, \frac{3\pi}{4}, 4.25, \frac{7\pi}{4} \right\} \approx \{1.11, 2.36, 4.25, 5.50\}$$

5)

$$\sin(x) \cos(x) = 1, \quad x \in [0, 2\pi)$$

$$\frac{1}{2} 2 \sin(x) \cos(x) = 1$$

$$\frac{1}{2} \sin(2x) = 1$$

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

$$L = \emptyset \quad (\text{Ingen løsning, tom løsningsmengde})$$