Matematik A
Harmoniske svingninger
14/4 2023

Opgave 1
restart

a)
$\cos(x) = 0.471$:

$x_0 := \cos^{K1}(0.471) = 1.080372276$
$x_1 := 2\,\pi \mathrm{K}\ x_0 = 5.202813032$
$x_2 := x_0 + 2\,\pi = 7.363557584$
$x_3 := x_1 + 2\,\pi = 11.48599834$

b)
$3 \cdot \sin(x) = 1.2$:

$x_0 := \sin^{K1}\left(\frac{1.2}{3}\right) = 0.4115168461$
$x_1 := \pi \mathrm{K}\ x_0 = 2.730075808$
$x_2 := x_0 + 2\,\pi = 6.694702154$
$x_3 := x_1 + 2\,\pi = 9.013261116$

c)
$\tan(x) = 0.8$:

$x_0 := \tan^{K1}(0.8) = 0.6747409422$
$x_1 := x_0 + \pi = 3.816333596$
$x_2 := x_1 + \pi = 6.957926250$
$x_3 := x_2 + \pi = 10.09951890$

Opgave 2
restart
with(*plots*) :
with(*Gym*) :

$f(x) := 9 \cdot \sin(0.2 \cdot x + 60) + 20$:

a)

$a := 9$:
$b := 0.2$:

$c := 60$:
$d := 20$:

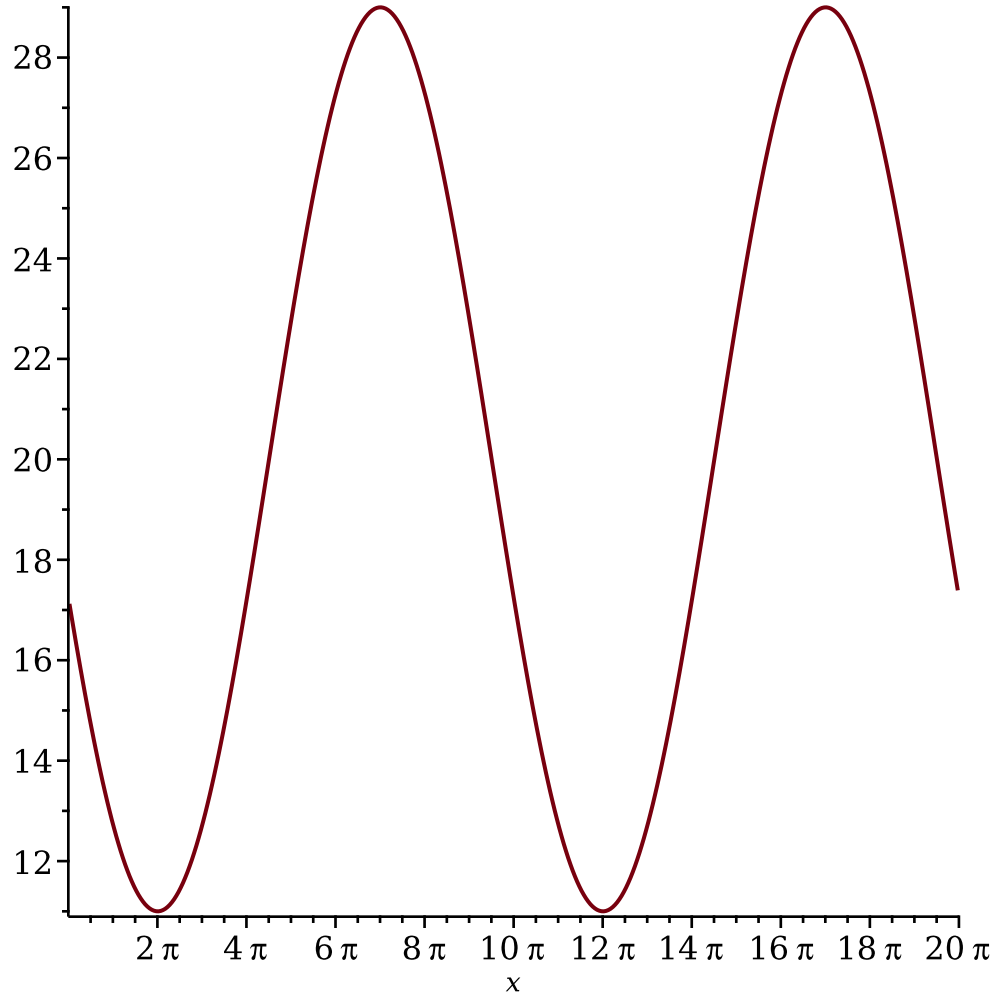
$amplitude := a \cdot 2 = 18$
$centralaksen := d = 20$

b)

$T := \frac{2\pi}{b} = 31.41592654\,10\,\pi$
$perioden := T = 31.41592654\,10\,\pi$

c)

$plot(f(x), x = 0..20\pi)$



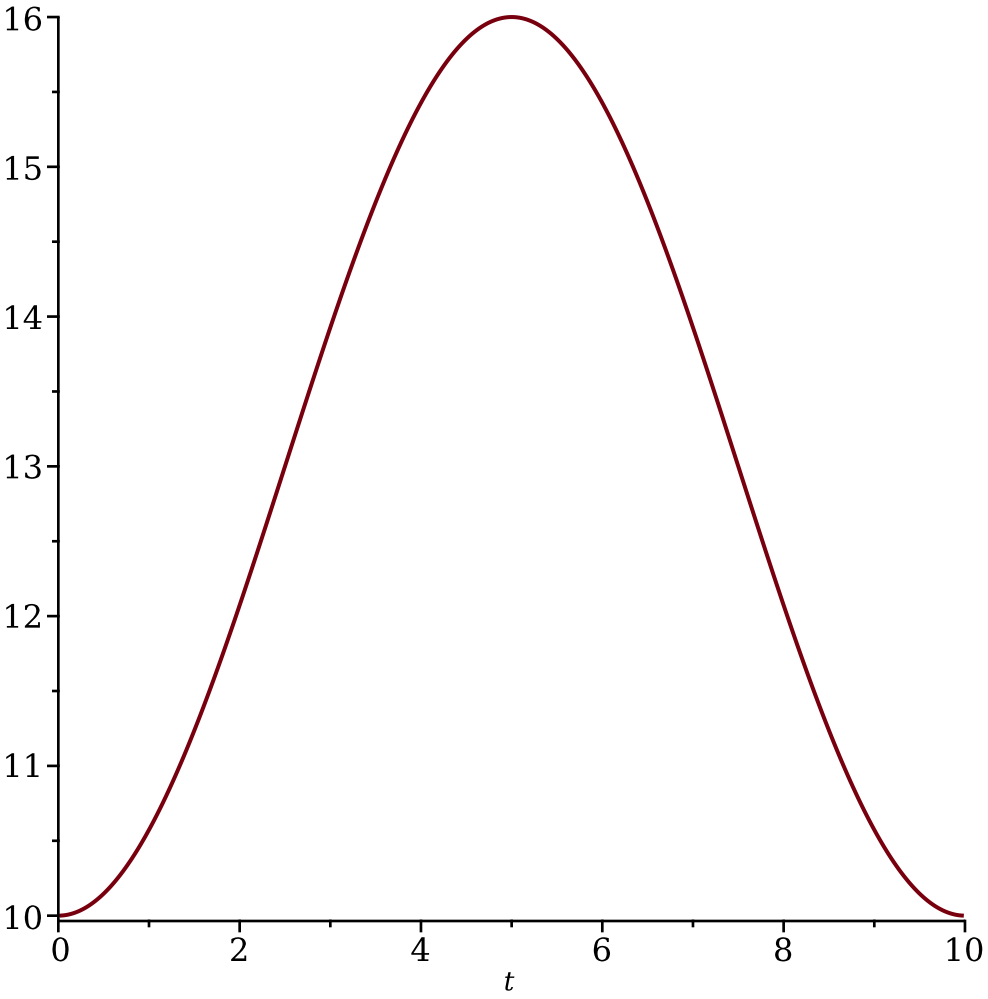
Opgave 3
$restart$:
$with(plots)$:
$with(Gym)$:

a)

$a := 3:$
$b := 0.2\,\pi:$
$c :=$K $0.5\,\pi:$
$d := 13:$

$f(t) := a \cdot \sin(b \cdot t + c) + d:$

$T := \dfrac{2\,\pi}{b} = 10.00000000$
$plot(f(t), t = 0..10)$



b)

$intervaller := intervalsolve(f(t) = 12, t = 0..20)$
$intervaller := [1.959132760, 8.040867239, 11.95913276, 18.04086724]$ **(1)**

c)

$intervalToPoint(x) := [x, f(x)]$:

$intervalPoints := map(intervalToPoint, intervaller) =$
$[[1.959132760, 12.00000000], [8.040867239, 12.00000000], [11.95913276, 12.00000000], [18.04086724, 11.99999999]]$

$pf := plot(f(t), t = 0..20)$:
$pl := plot(12, x = 0..20)$:

$pointToPointPlot(point) := pointplot(point, symbol = solidbox, symbolsize = 10, color = blue)$:

$points := map(pointToPointPlot, intervalPoints)$:

$display(pf, pl, points)$