Matematik A
Harmoniske svingninger
14/4 2023
Simon From Jakobsen

*Maple konverterer minus-tegn til 'K', når jeg exporterer til PDF.

Opgave 1
restart

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

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

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

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

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)

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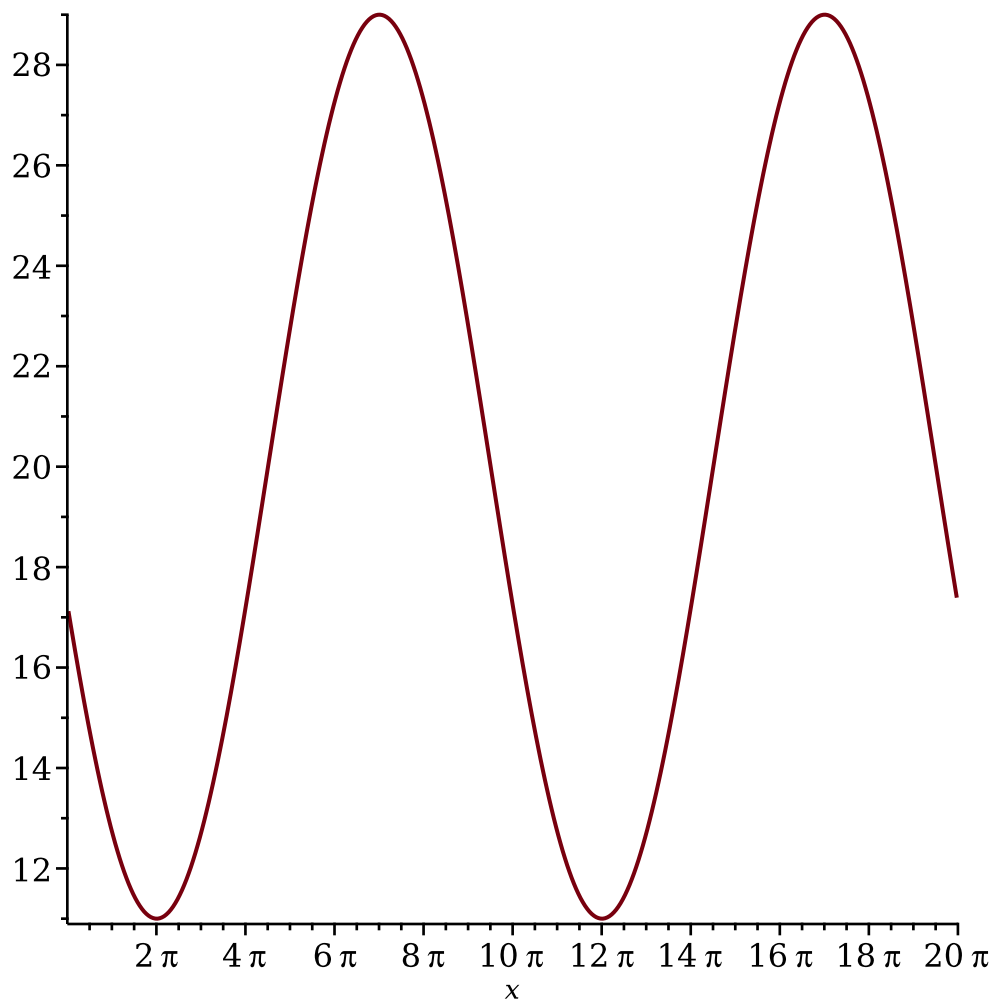$perioden := T = 31.41592654\,10\,\pi$

c)

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

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

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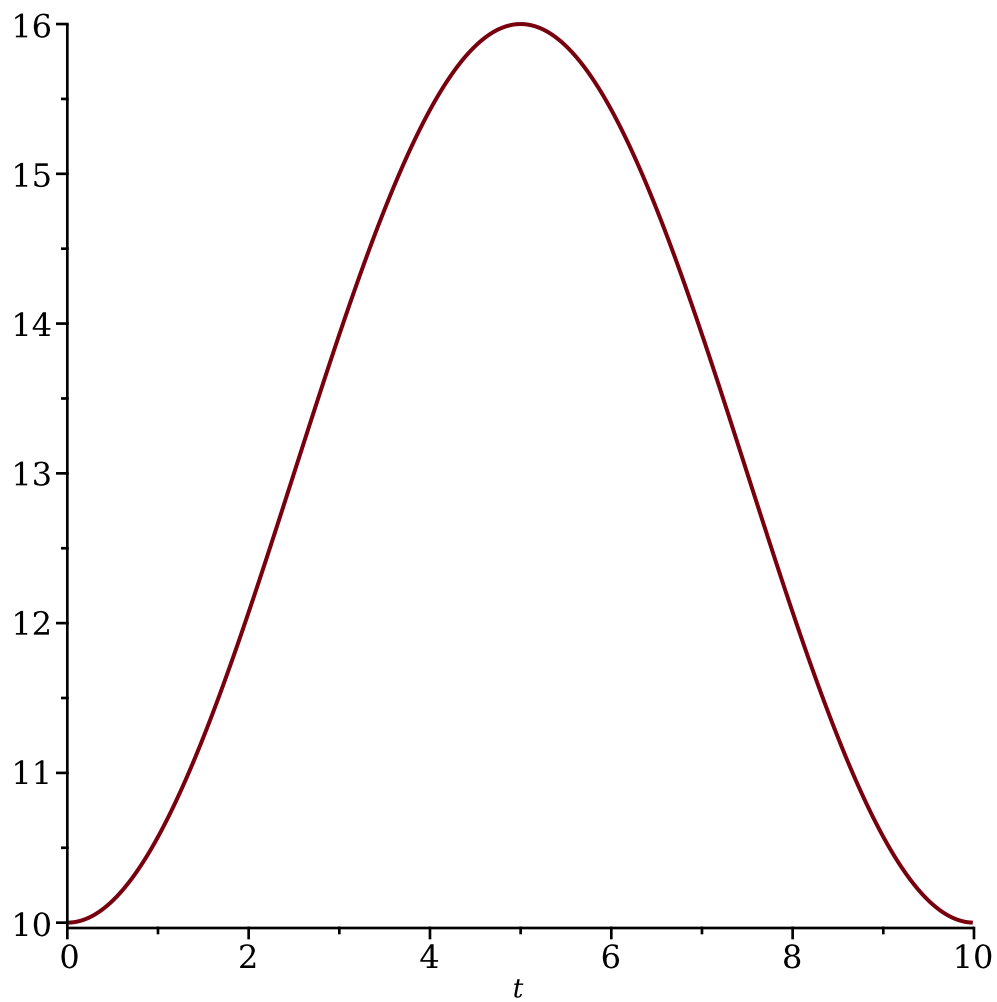$c := K\ 0.5\,\pi$:
$d := 13$:

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

$T := \dfrac{2\,\pi}{b}$ = **10.00000000**

$\dfrac{1}{T}$ = **0.1000000000**

plot$(f(t), t = 0 .. 10)$

b)

$intervaller := intervalsolve(f(t) = 12, t = 0..20)$

$\qquad intervaller := [1.959132760, 8.040867239, 11.95913276, 18.04086724]$ **(1)**

c)

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

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

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

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

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

$display(pf, pl, points)$