

Matematik A
Harmoniske svingninger
14/4 2023
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Opgave 1

restart

a)

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

$$x_0 := \cos^{-1}(0.471) = 1.080372276$$

$$x_1 := 2\pi K \ x_0 = 5.202813032$$

$$x_2 := x_0 + 2\pi = 7.363557584$$

$$x_3 := x_1 + 2\pi = 11.48599834$$

b)

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

$$x_0 := \sin^{-1}\left(\frac{1.2}{3}\right) = 0.4115168461$$

$$x_1 := \pi K \ x_0 = 2.730075808$$

$$x_2 := x_0 + 2\pi = 6.694702154$$

$$x_3 := x_1 + 2\pi = 9.013261116$$

c)

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

$$x_0 := \tan^{-1}(0.8) = 0.6747409422$$

$$x_1 := x_0 + \pi = 3.816333596$$

$$x_2 := x_1 + \pi = 6.957926250$$

$$x_3 := x_2 + \pi = 10.09951890$$

Opgave 2

restart

with(plots) :

with(Gym) :

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

a)

$$a := 9 :$$

$$b := 0.2 :$$

$$c := 60 :$$

$$d := 20 :$$

$$\text{amplitude} := a \cdot 2 = 18$$

$$\text{centralaksen} := d = 20$$

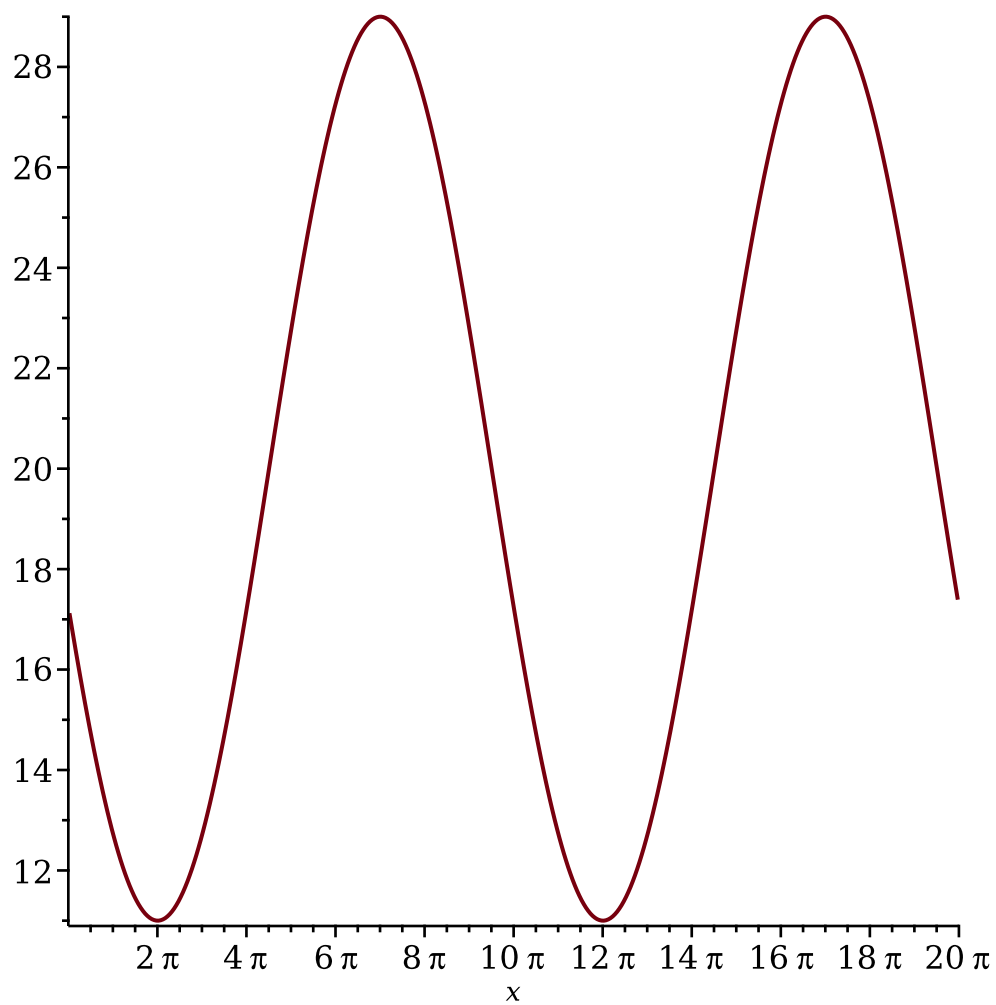
b)

$$T := \frac{2\pi}{b} = 31.4159265410\pi$$

$$\text{perioden} := T = 31.4159265410\pi$$

c)

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



Opgave 3

restart:

with(plots):

with(Gym):

$a := 3:$

$b := 0.2 \pi:$

$c := \pi/2:$

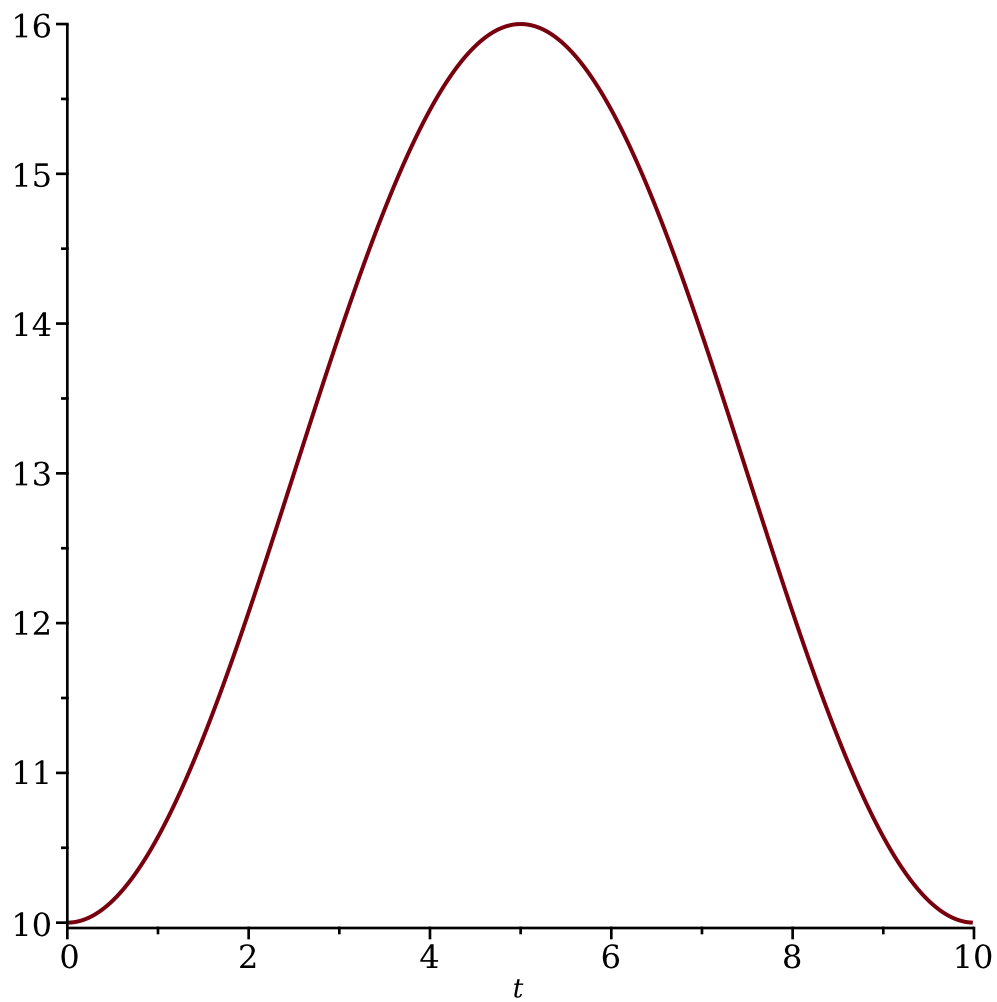
$d := 13:$

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

$T := \frac{2\pi}{b} = 10.00000000$

$\frac{1}{T} = 0.1000000000$

$\text{plot}(f(t), t = 0..10)$



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)
```

