```
> assume(Vm, positive);
> V1:=Vm*cos(theta);
```

$$V1 := Vm\sim \cos(\theta)$$

```
> V2:=Vm*cos(theta-2*Pi/3);
```

$$V2 := -Vm\sim \cos\left(\theta + \frac{1}{3}\pi\right)$$

```
> V3:=Vm*cos(theta-4*Pi/3);
```

$$V3 := -Vm\sim \sin\left(\theta + \frac{1}{6}\pi\right)$$

```
> Vrms:=sqrt(1/(2*Pi)*int(V1**2,theta=0..2*Pi
  ));
```

$$Vrms := \frac{1}{2}\sqrt{2}\ Vm\sim$$

```
> evalf(Vrms);
```

$$.7071067810\ Vm\sim$$

```
> VV13:=1/(2*Pi)*int((V1-V3)**2,theta=0..2*Pi
  );
```

$$VV13 := \frac{3}{2}\ Vm\sim^2$$

```
> V13:=sqrt(VV13);
```

$$V13 := \frac{1}{2}\sqrt{6}\ Vm\sim$$

```
> evalf(V13);
```

$$1.224744872\ Vm\sim$$

```
> VVdc:=1/(Pi/3)*int((V1-V3)**2,theta=0..Pi/3
  );
```

$$VVdc := 3\,\frac{\frac{3}{4}\sqrt{3}\ Vm\sim^2 + \frac{1}{2}\pi\ Vm\sim^2}{\pi}$$

```
> Vdc:=simplify(sqrt(VVdc));
```

$$Vdc := \frac{1}{2}\frac{\sqrt{3}\ Vm\sim\sqrt{3\sqrt{3}+2\pi}}{\sqrt{\pi}}$$

```
> evalf(Vdc);
```

$$1.655442544\ Vm\sim$$

```
> Vdc/V13;
```

$$\frac{1}{6}\frac{\sqrt{3}\sqrt{3\sqrt{3}+2\pi}\sqrt{6}}{\sqrt{\pi}}$$

```
> evalf(Vdc/V13);
```

$$1.351663177$$

```
> Vdc/Vm;
```

$$\frac{1}{2}\frac{\sqrt{3}\sqrt{3\sqrt{3}+2\pi}}{\sqrt{\pi}}$$

```
> evalf(Vdc/Vm);
```

$$1.655442544$$

```
> VYdc:=1/(Pi/3)*int(V1**2,theta=0..Pi/3);
```

$$VYdc := 3\frac{\frac{1}{8}\sqrt{3}\ Vm\sim^2+\frac{1}{6}\pi\ Vm\sim^2}{\pi}$$

```
> VYdc:=simplify(sqrt(VYdc));
```

$$VYdc := \frac{1}{4}\frac{\sqrt{2}\ Vm\sim\sqrt{3\sqrt{3}+4\pi}}{\sqrt{\pi}}$$

```
> evalf(VYdc);
```

$$.8406832550\ Vm\sim$$

```
> VYdc/V13;
```

$$\frac{1}{12}\frac{\sqrt{2}\sqrt{3\sqrt{3}+4\pi}\sqrt{6}}{\sqrt{\pi}}$$

```
> evalf(VYdc/V13);
```

$$.6864150034$$

```
> VYdc/Vm;
```

$$\frac{1}{4}\frac{\sqrt{2}\sqrt{3\sqrt{3}+4\pi}}{\sqrt{\pi}}$$

```
> evalf(VYdc/Vm);
```

.8406832550

```
> VYYdc:=1/(Pi/6)*int(V1**2,theta=0..Pi/6);
```

$$VYYdc := 6\,\frac{\frac{1}{8}\sqrt{3}\ Vm\sim^2+\frac{1}{12}\pi\ Vm\sim^2}{\pi}$$

```
> VYYdc:=simplify(sqrt(VYYdc));
```

$$VYYdc := \frac{1}{2}\frac{Vm\sim\sqrt{3\sqrt{3}+2\pi}}{\sqrt{\pi}}$$

```
> evalf(VYYdc);
```

.9557701980 $Vm\sim$

```
> VYYdc/V13;
```

$$\frac{1}{6}\frac{\sqrt{3\sqrt{3}+2\pi}\sqrt{6}}{\sqrt{\pi}}$$

```
> evalf(VYYdc/V13);
```

.7803830990

```
> VYYdc/Vm;
```

$$\frac{1}{2}\frac{\sqrt{3\sqrt{3}+2\pi}}{\sqrt{\pi}}$$

```
> evalf(VYYdc/Vm);
```

.9557701980

```
> plot([V1,V2,V3,Vrms,-Vrms],theta=0..2*Pi);
Plotting error, empty plot
> plot([V2-V3,V13,-V13],theta=0..2*Pi);
```

```
> Vm:=16.0*sqrt(2);
```

$$Vm := 16.0\sqrt{2}$$

```
> V1:=Vm*cos(theta);
```

$$V1 := 16.0\sqrt{2}\cos(\theta)$$

```
> V2:=Vm*cos(theta-2*Pi/3);
```

$$V2 := -16.0\sqrt{2}\cos\left(\theta + \frac{1}{3}\pi\right)$$

```
> V3:=Vm*cos(theta-4*Pi/3);
```

$$V3 := -16.0\sqrt{2}\sin\left(\theta + \frac{1}{6}\pi\right)$$

```
> Vrms:=sqrt(1/(2*Pi)*int(V1**2,theta=0..2*Pi
  ));
```

$$Vrms := 28.35926162\sqrt{\frac{1}{\pi}}$$

```
> evalf(Vrms);
```

$$16.00000000$$

```
> VV13:=1/(2*Pi)*int((V1-V3)**2,theta=0..2*Pi
  );
```

$$VV13 := \frac{2412.743159}{\pi}$$

```
> V13:=sqrt(VV13);
```

$$V13 := 49.11968199\sqrt{\frac{1}{\pi}}$$

```
> evalf(V13);
```

$$27.71281292$$

```
> VVdc:=1/(Pi/3)*int((V1-V3)**2,theta=0..Pi/3
  );
```

$$VVdc := \frac{4408.065690}{\pi}$$

```
> Vdc:=simplify(sqrt(VVdc));
```

$$Vdc := 37.45838875$$

```
> evalf(Vdc);
```

$$37.45838875$$

```
> Vdc/V13;
```

$$\frac{.7625942847}{\sqrt{\frac{1}{\pi}}}$$

```
> evalf(Vdc/V13);
```

$$1.351663177$$

```
> Vdc/Vm;
```

$$1.170574649\sqrt{2}$$

```
> evalf(Vdc/Vm);
```

$$1.655442544$$

```
> VYdc:=1/(Pi/3)*int(V1**2,theta=0..Pi/3);
```

$$VYdc := \frac{1136.801474}{\pi}$$

```
> VYdc:=simplify(sqrt(VYdc));
```

$$VYdc := 19.02249058$$

```
> evalf(VYdc);
```

$$19.02249058$$

```
> VYdc/V13;
```

$$\frac{.3872681949}{\sqrt{\frac{1}{\pi}}}$$

```
> evalf(VYdc/V13);
```

$$.6864150034$$

```
> VYdc/Vm;
```

$$.5944528305\sqrt{2}$$

```
> evalf(VYdc/Vm);
```

$$.8406832549$$

```
> VYYdc:=1/(Pi/6)*int(V1**2,theta=0..Pi/6);
```

$$VYYdc := \frac{1469.355230}{\pi}$$

```
> VYYdc:=simplify(sqrt(VYYdc));
```

$$VYYdc := 21.62661083$$

```
> evalf(VYYdc);
```

$$21.62661083$$

```
> VYYdc/V13;
```

$$\frac{.4402840156}{\sqrt{\frac{1}{\pi}}}$$

```
> evalf(VYYdc/V13);
```

$$.7803830990$$

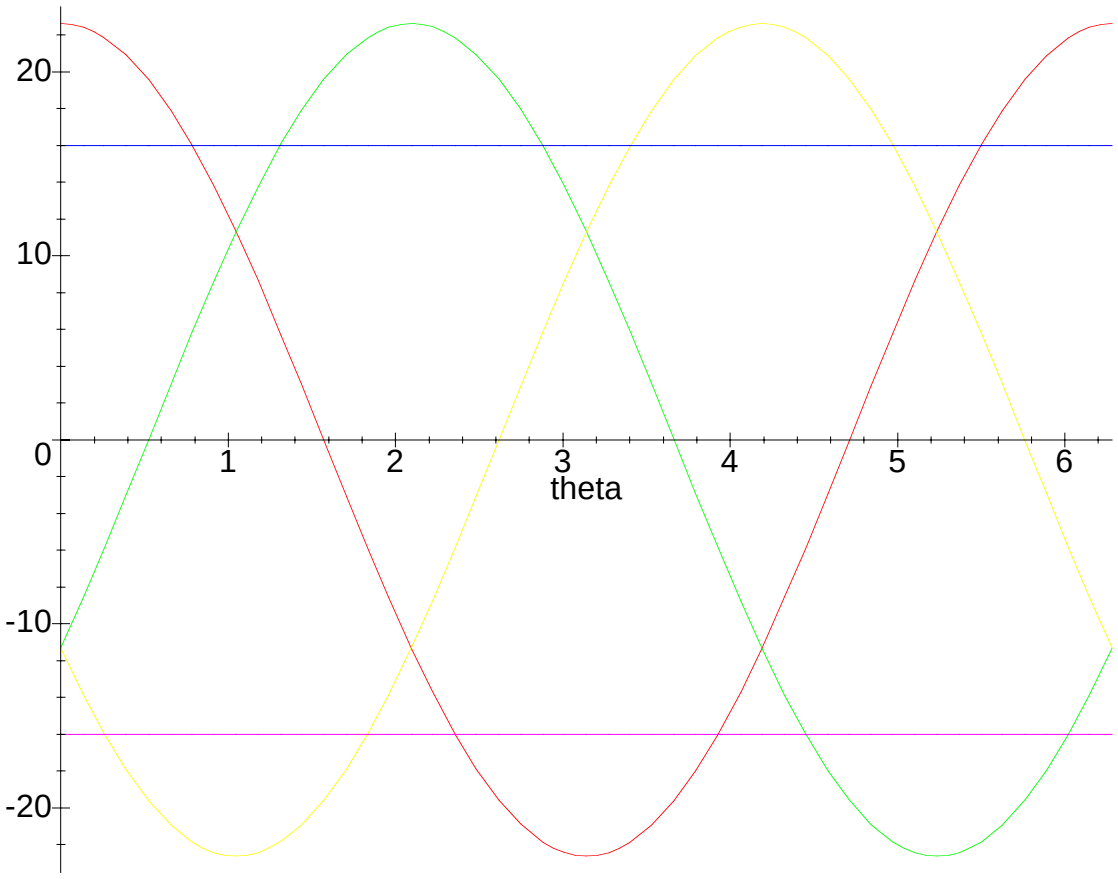
```
> VYYdc/Vm;
```

$$.6758315885\sqrt{2}$$

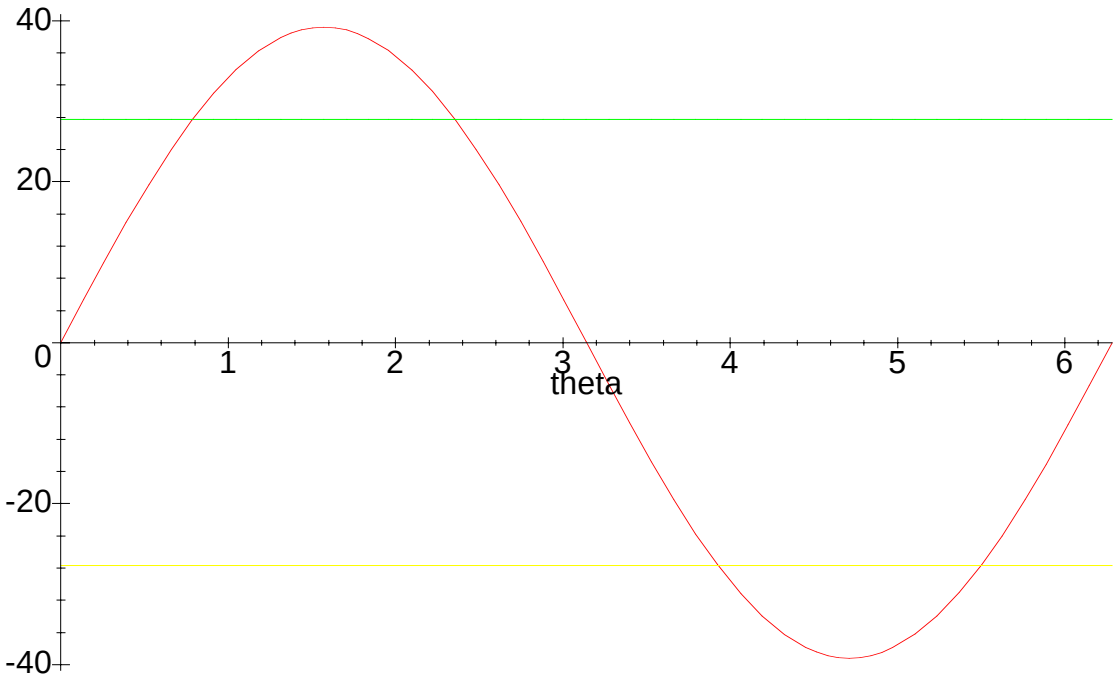
```
> evalf(VYYdc/Vm);
```

$$.9557701981$$

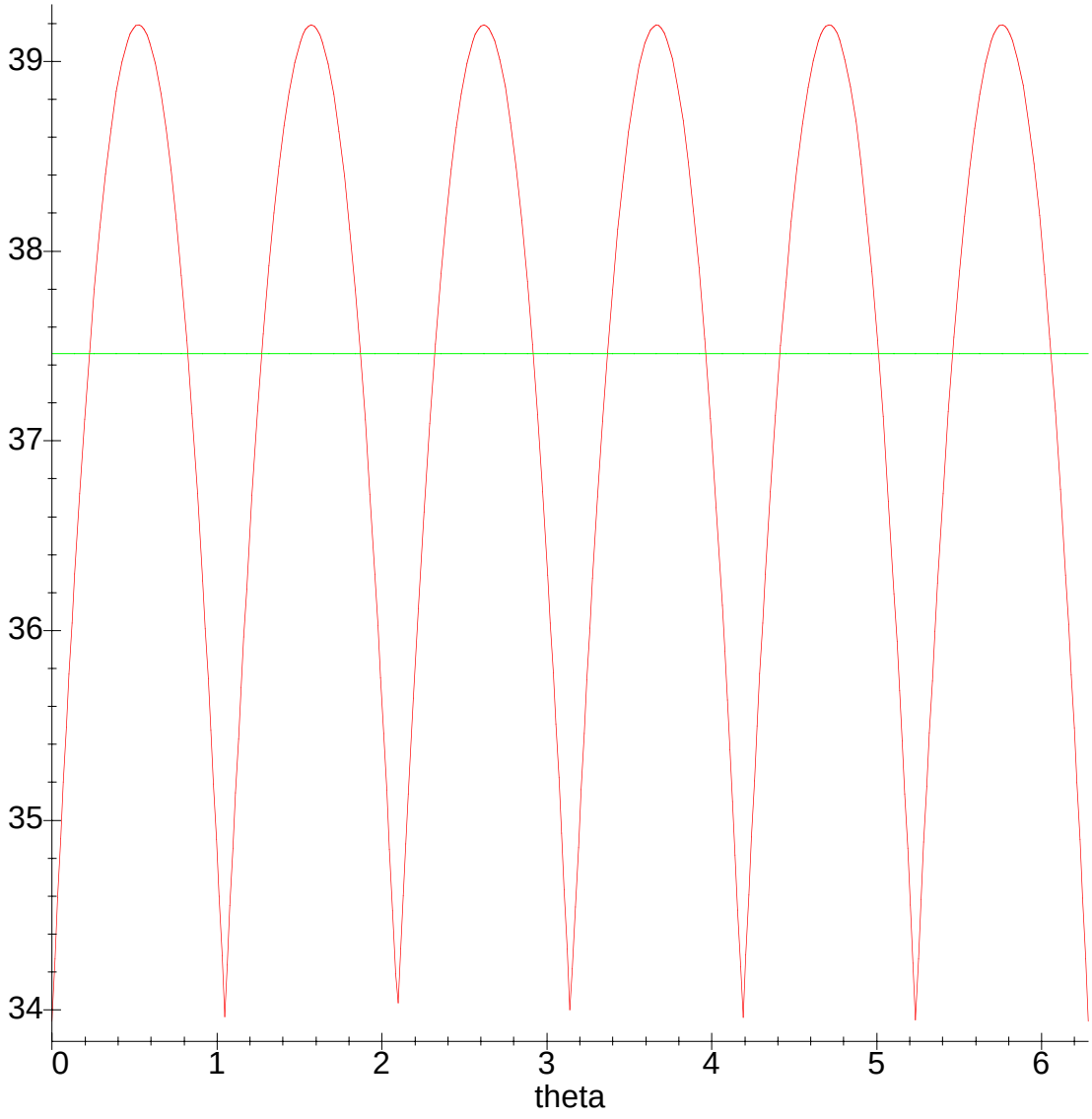
```
> plot([V1,V2,V3,Vrms,-Vrms],theta=0..2*Pi);
```



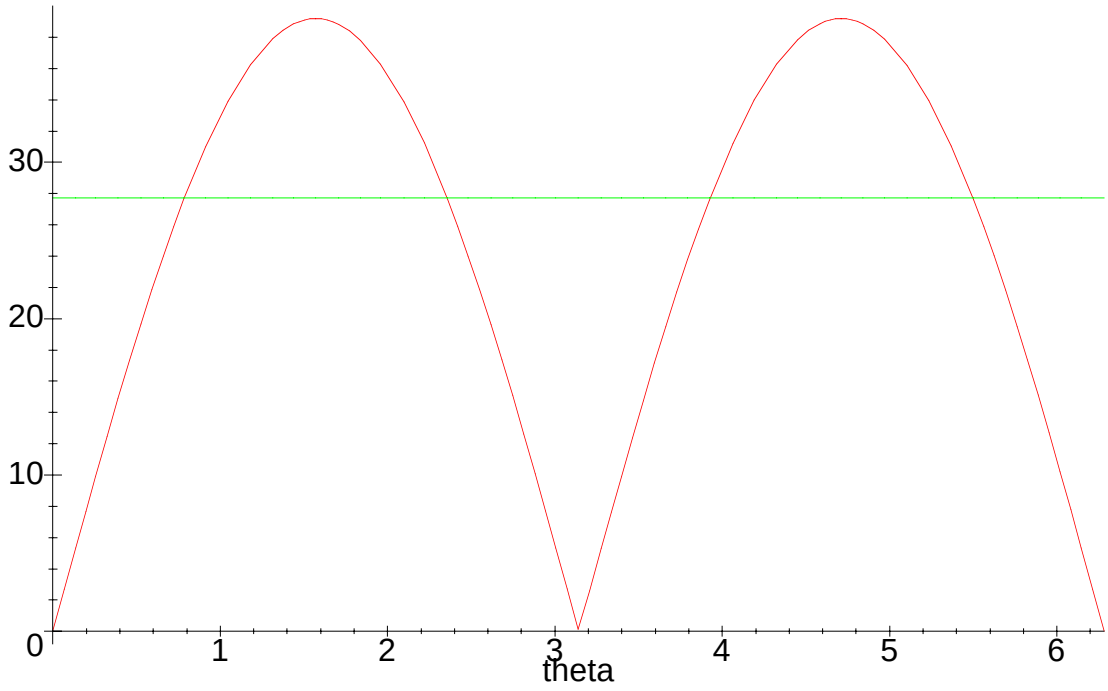

```
> plot([V2-V3,V13,-V13],theta=0..2*Pi);
```



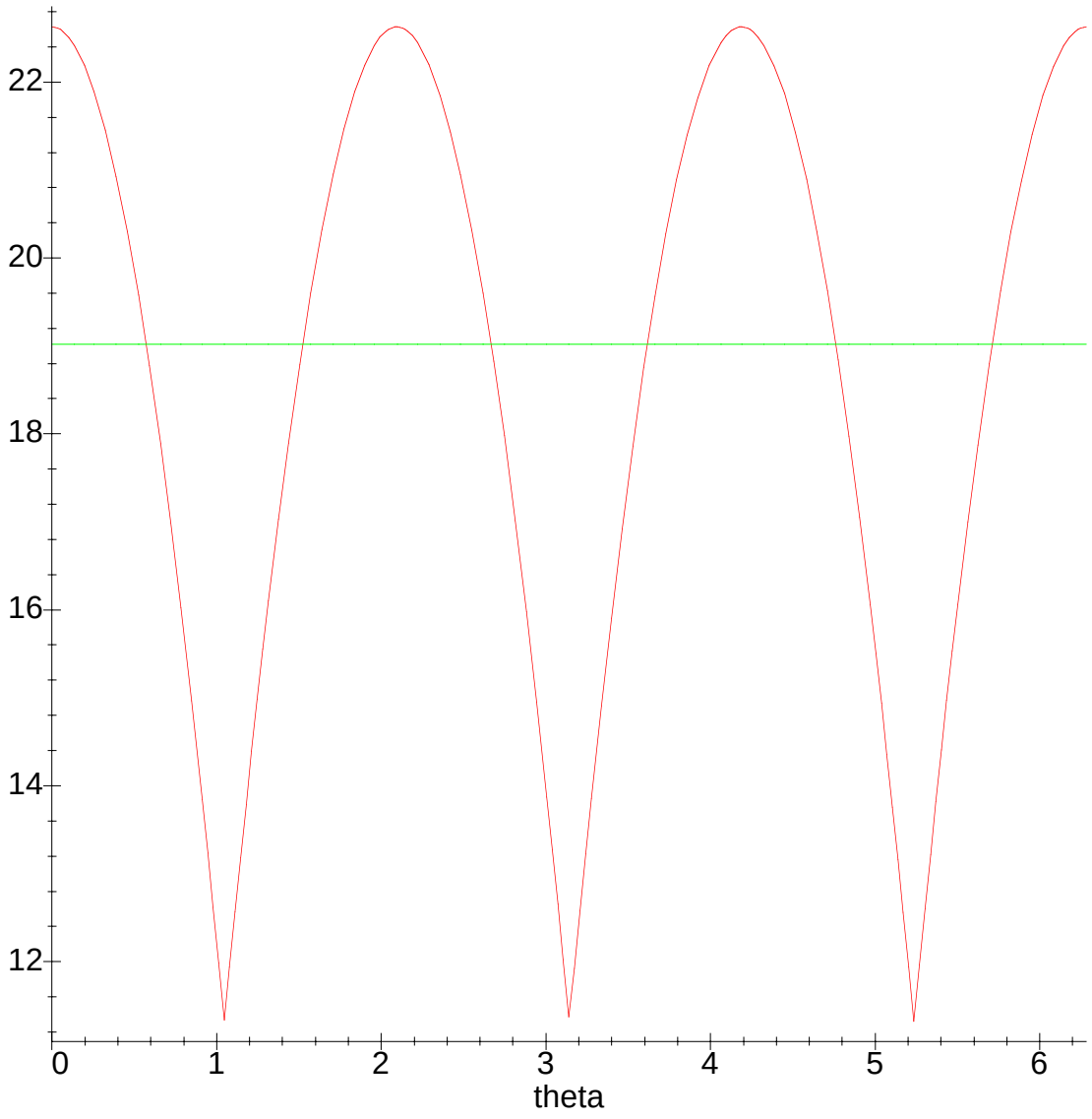

```
> plot([max(V1,V2,V3)-min(V1,V2,V3),Vdc],thet
  a=0..2*Pi);
```



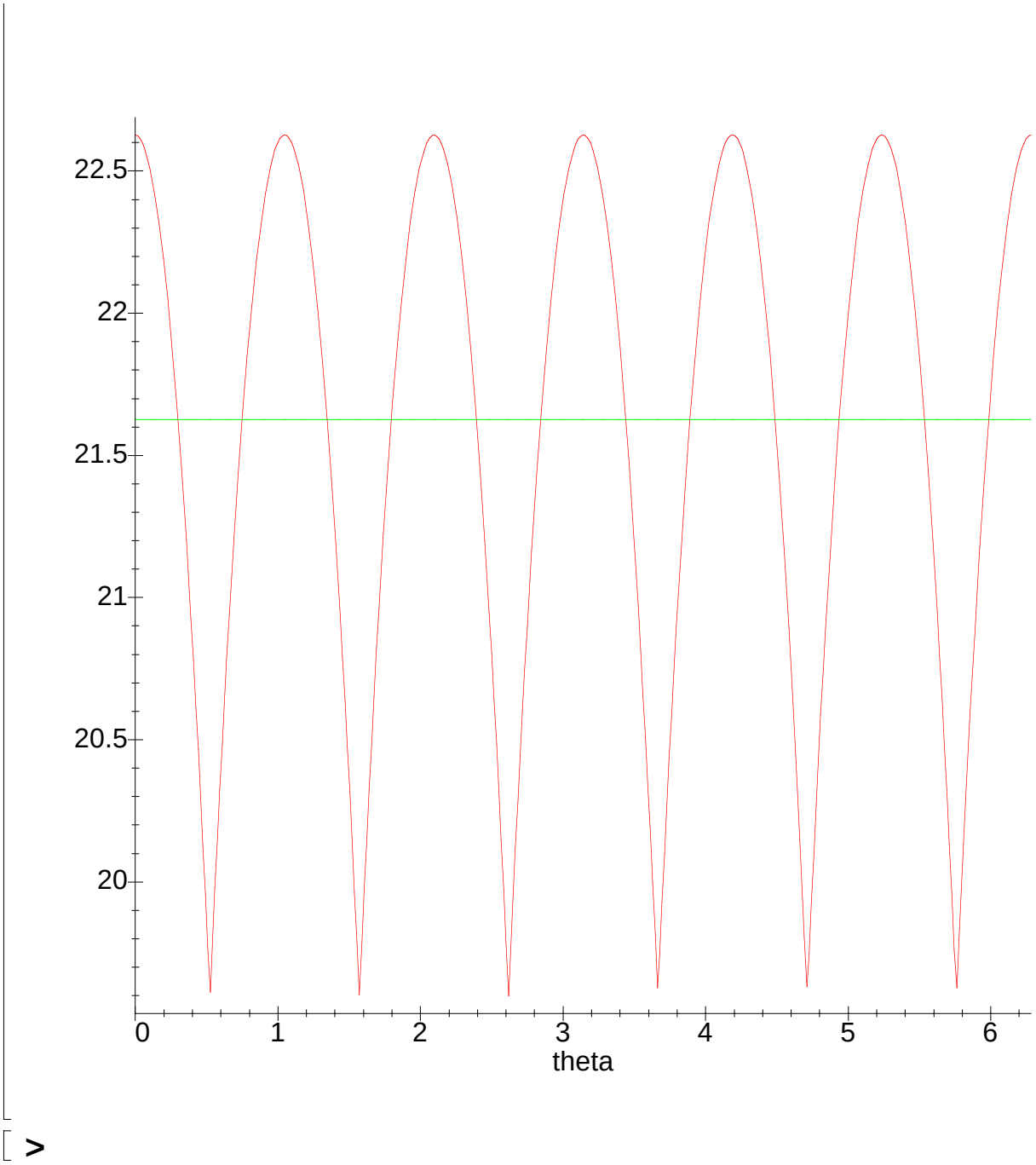

```
> plot([abs(V2-V3),V13],theta=0..2*Pi);
```




```
> plot([max(V1,V2,V3),VYdc],theta=0..2*Pi);
```




```
> plot([max(abs(V1),abs(V2),abs(V3)),VYYdc],t
  heta=0..2*Pi);
```


22.5
22
21.5
21
20.5
20
0
1
2
3
4
5
6
theta

>