

```
> restart;
> kappa:=simplify((df*ddg-ddf*dg)/(df^2+dg^2)^(3/2));
```

$$\kappa := -\frac{-df\,ddg + ddf\,dg}{(df^2 + dg^2)^{3/2}} \quad (1)$$

```
> f:=cos(t)*(2+sin(5*t));g:=sin(t)*(2+sin(5*t));
f:=cos(t)*(2+sin(5*t))
g:=sin(t)*(2+sin(5*t))
```

$$(2)$$

```
> df:=diff(f,t);dg:=diff(g,t);ddf:=diff(df,t);ddg:=diff(dg,t);
df:=-sin(t)*(2+sin(5*t))+5*cos(t)*cos(5*t)
dg:=cos(t)*(2+sin(5*t))+5*sin(t)*cos(5*t)
ddf:=-cos(t)*(2+sin(5*t))-10*sin(t)*cos(5*t)-25*cos(t)*sin(5*t)
ddg:=-sin(t)*(2+sin(5*t))+10*cos(t)*cos(5*t)-25*sin(t)*sin(5*t)
```

$$(3)$$

```
> t0:=0;
t0:=0
```

$$(4)$$

```
> kappa0:=simplify(subs(t=t0,kappa));
kappa0:=54/841*sqrt(29)
```

$$(5)$$

```
> evalf(kappa0);
0.3457775262
```

$$(6)$$

```
> rho:=1/kappa0;
rho:=29/54*sqrt(29)
```

$$(7)$$

```
> nx:=simplify(subs(t=t0,-dg/sqrt(df^2+dg^2)));ny:=simplify(subs(t=t0,df/sqrt(df^2+dg^2)));
nx:=-2/29*sqrt(29)
ny:=5/29*sqrt(29)
```

$$(8)$$

```
> x0:=subs(t=t0,f)+rho*nx;y0:=subs(t=t0,g)+rho*ny;
x0:=cos(0)*(2+sin(0))-29/27
y0:=sin(0)*(2+sin(0))+145/54
```

$$(9)$$

```
> eq:=(x-x0)^2+(y-y0)^2=rho^2;
eq:=(x-25/27)^2+(y-145/54)^2=24389/2916
```

$$(10)$$

```
> h:=lhs(eq)-rhs(eq);
h:=(x-25/27)^2+(y-145/54)^2-24389/2916
```

$$(11)$$

```
> with(plots):
> P1:=contourplot(h,x=-2..4,y=-1..7,contours=[0],
grid=[200,200],scaling=constrained);
> P2:=plot([f,g,t=0..2*Pi],scaling=constrained);
> display(P1,P2);
```

