S6 Rational Solution Generator (Okamoto)

```
> restart;with(plots):with(orthopoly):with(linalg):alias(w=w(z),
  sigma=sigma(z)):
```

```
> S4:=diff(sigma,z$2)^2-4*(z*diff(sigma,z)-sigma)^2+4*diff(sigma,z)
  *(diff(sigma,z)+2*theta[0])*(diff(sigma,z)+2*theta[infinity]);
```

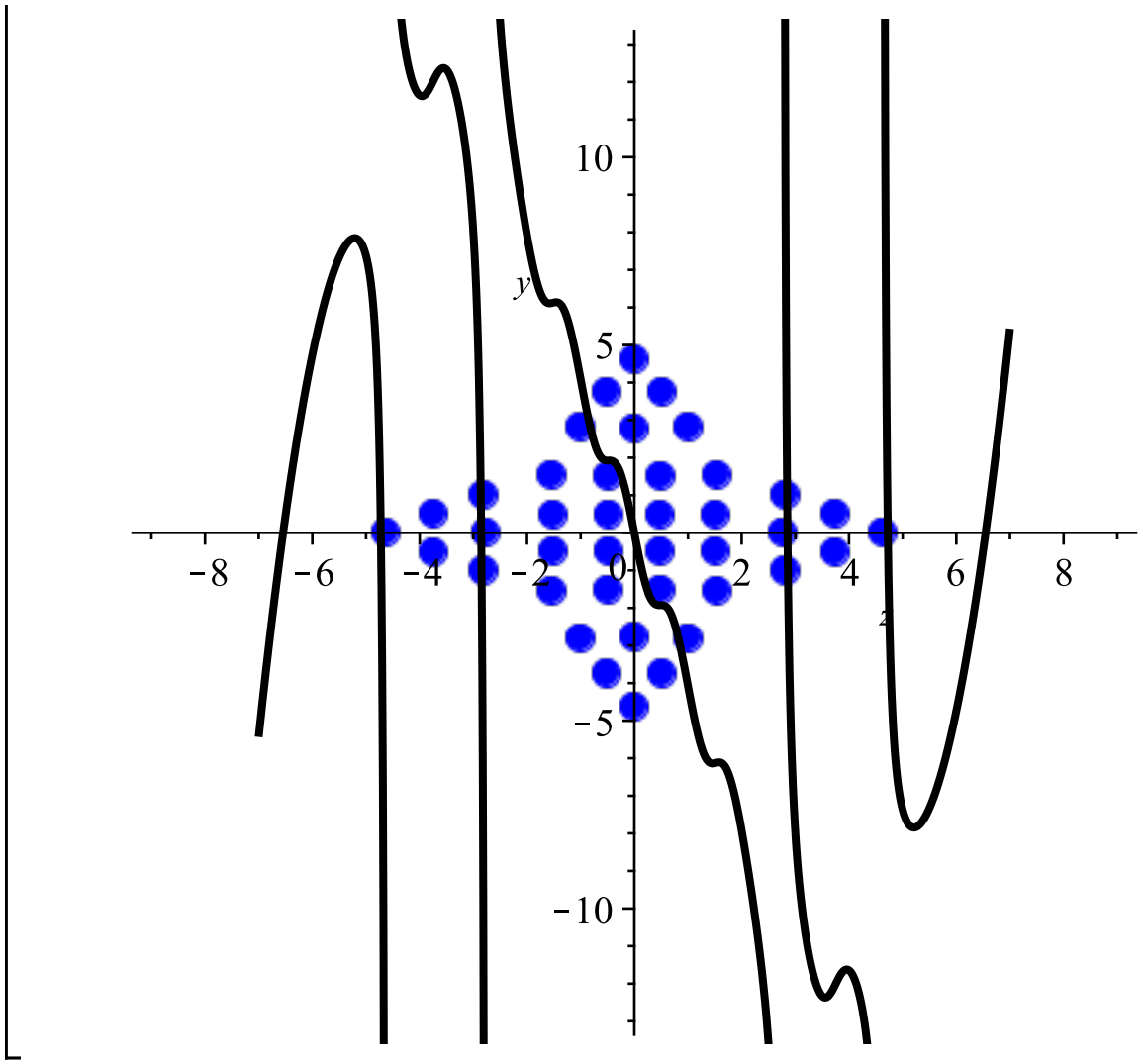
$$S4 := \left(\frac{\partial^2}{\partial z^2}\,\sigma\right)^2 - 4\left(z\left(\frac{\partial}{\partial z}\,\sigma\right) - \sigma\right)^2 + 4\left(\frac{\partial}{\partial z}\,\sigma\right)\left(\frac{\partial}{\partial z}\,\sigma + 2\,\theta_0\right)\left(\frac{\partial}{\partial z}\,\sigma + 2\,\theta_\infty\right) \quad (1)$$

```
> PP:=taylor(exp(2*z*lambda+3*lambda^2),lambda=0,72):
> for n from 1 to 70 do phi[n]:=coeff(PP,lambda,n); od:n:='n':
> Q:=(m,n)->det(Wronskian([seq(phi[3*j-2],j=1..m+n-1),seq(phi[3*
  k-1],k=1..n-1)],z)):
> m:=4;n:=4;
```

$$m := 4$$

$$n := 4 \quad (2)$$

```
> sigma:=4/27*z^3-2/3*(2*n+m-1)*z+diff(ln(Q(m,n)),z):
> RootOf(Q(m,n),z):J1:=evalf(allvalues(%)):
> A:=complexplot([J1],style=point,symbol=solidcircle,color=blue,
  symbolsize=20):
> C:=plot(sigma,z=-7..7,y=-10..10,colour=black,thickness=3,discont=
  true):display(A,C);
```


10
y
5
-5
-10
-8
-6
-4
-2
0
2
4
6
8