```
> restart:with(linalg):with(plots):with(LinearAlgebra[Modular])
  :alias(w=w(z)):
> PP:=taylor(exp(z*lambda-4/3*lambda^3),lambda=0,41):
> for n from 1 to 40 do p[n]:=coeff(PP,lambda,n); od: n:='n':
> q:=n->det(wronskian([seq(p[2*j-1],j=1..n)],z)):
> Q:=n->sort(q(n)/coeff(q(n),z,degree(q(n),z))):
> P2:=diff(w,z,z)-(2*w^3+z*w+A);
```

$$P2 := \frac{\partial^2}{\partial z^2} w - 2 w^3 - z w - A \tag{1}$$

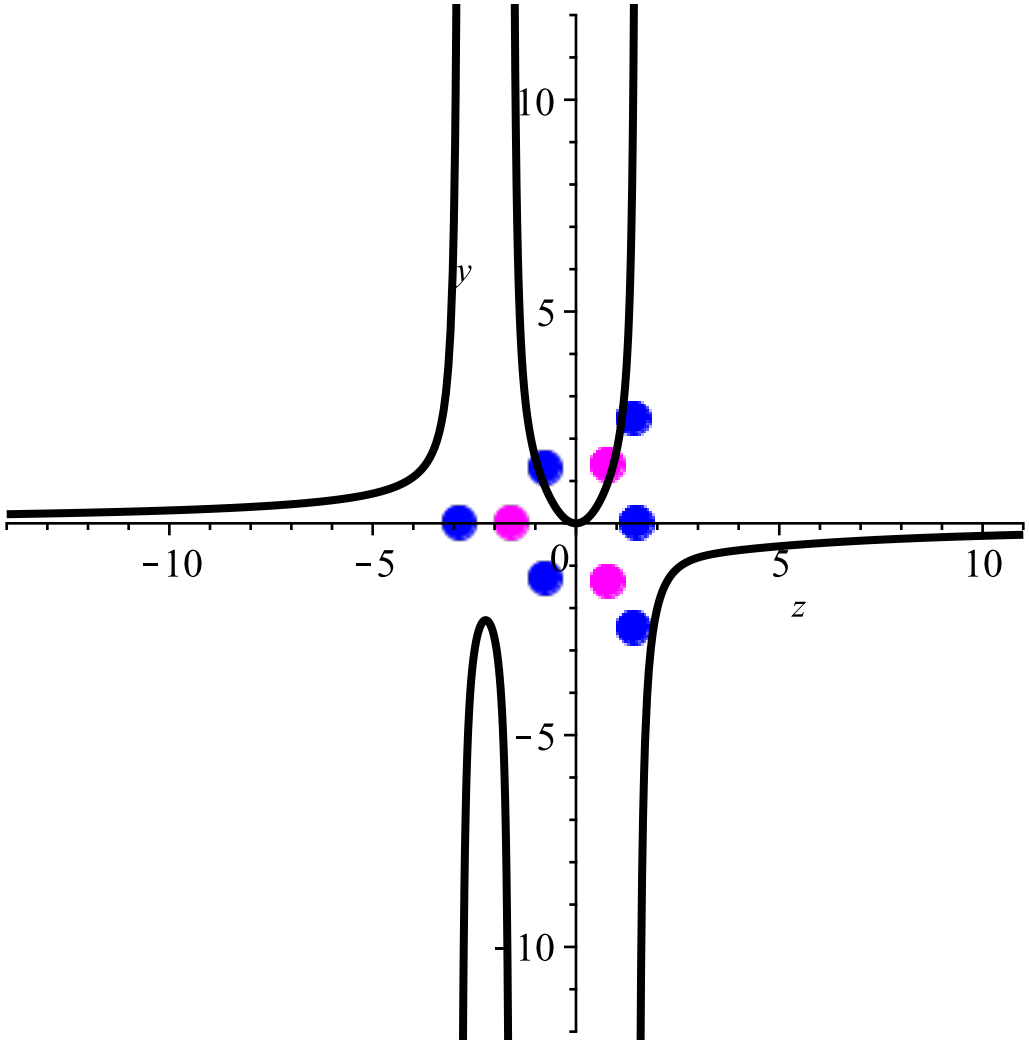
```
> n:=3;A:=n;
```

$$n := 3$$
$$A := 3 \tag{2}$$

```
> w:=convert(diff(ln(Q(n-1)/Q(n)),z),parfrac,z):
> simplify(P2);
```

$$0 \tag{3}$$

```
> RootOf(Q(n-1),z):J1:=evalf(allvalues(%)):RootOf(Q(n),z):J2:=
  (allvalues(%)):
> A:=complexplot([J1],z=-7..5,y=-10..10,style=point,symbol=
  solidcircle,color=magenta,symbolsize=25):
> B:=complexplot([J2],z=-7..5,y=-10..10,style=point,symbol=
  solidcircle,color=blue,symbolsize=25):
> C:=plot(w,z=-14..11,y=-12..12,colour=black,thickness=3,discont=
  true):display(A,B,C);
```




```
> restart;
> with(linalg):with(plots):with(LinearAlgebra[Modular]):alias
  (sigma=sigma(z)):
> PP:=taylor(exp(z*lambda-4/3*lambda^3),lambda=0,41):
> for n from 1 to 40 do p[n]:=coeff(PP,lambda,n); od: n:='n':
> q:=n->det(wronskian([seq(p[2*j-1],j=1..n)],z)):
> Q:=n->sort(q(n)/coeff(q(n),z,degree(q(n),z))):
> S2:=(diff(sigma,z,z))^2+4*diff(sigma,z)^3+2*diff(sigma,z)*(z*diff
  (sigma,z)-sigma)-1/4*(alpha+1/2)^2;
```

$$S2 := \left(\frac{\partial^2}{\partial z^2}\,\sigma\right)^2 + 4\left(\frac{\partial}{\partial z}\,\sigma\right)^3 + 2\left(\frac{\partial}{\partial z}\,\sigma\right)\left(z\left(\frac{\partial}{\partial z}\,\sigma\right) - \sigma\right) - \frac{1}{4}\left(\alpha + \frac{1}{2}\right)^2 \tag{4}$$

```
> n:=3;alpha:=n;
```

$$n := 3$$

$$\alpha := 3 \tag{5}$$

```
> sigma:=convert(-1/8*z^2+diff(ln(Q(n)),z),parfrac,z);
```

$$\sigma := -\frac{1}{8}\,z^2 + \frac{6\,z^2\left(z^3+10\right)}{z^6+20\,z^3-80} \tag{6}$$

```
> simplify(S2);
```

(7)

0 (7)

```
> RootOf(Q(n),z):J1:=(allvalues(%)):
> A:=complexplot([J1],z=-7..5,y=-10..10,style=point,symbol=
  solidcircle,color=blue,symbolsize=25):
> C:=plot(sigma,z=-20..17,y=-18..18,colour=black,thickness=3,
  discont=true):display(A,C);
```