We solve the Wronskian equation as described in Arutyunov: “Bethe Ansatz”, section 8.6 “Wronskian solution”, subsection 8.6.7 “TQ-relations and quantum spectral curve for gl_2.”.

In[26]:=
```
NN := 4 (*Fundamental spin chain length*)
```

In[55]:=
```
M1 := 2(*Parametrizes Young diagram of relevant multiplet*)
M2 := NN + 1 - M1
```

In[57]:=
```
Q1[u_] := u ^ M1 (1 + Sum[a1[k] / u ^ k, {k, 1, M1}])
Q2[u_] := u ^ M2 (1 + Sum[a2[k] / u ^ k, {k, 1, M2}])
```

In[59]:=
```
T[u_] := (Q1[u - η] × Q2[u + η] - Q1[u + η] × Q2[u - η]) / ((NN - 2 M1 + 1) η)(*Transfer matrix*)
```

In[60]:=
```
LHS := Product[u - u[j], {j, 1, NN}] (NN - 2 M1 + 1) η
RHS :=  Q1[u] × Q2[u + η] - Q2[u] × Q1[u + η]
```

In[62]:=
```
e[i_] := Coefficient[LHS, u, i] == Coefficient[RHS, u, i]
```

In[63]:=
```
Eq := Array[e, {NN}, {{0, NN - 1}}]
```

In[64]:=
```
A := Join[Array[a1, {M1}], Array[a2, {M2}]]
```

In[73]:=
```
A
```

Out[73]=
```
{a1[1], a1[2], a2[1], a2[2], a2[3]}
```

In[65]:=
```
Sol := Solve[Eq, A]
```

In[75]:=
```
Expand[
 Simplify[Limit[Simplify[T[u] /. Sol[[1]] /. u[1] → 0 /. u[3] → 0], {u[2] → η, u[4] → η}] / (u - η) ^ 2,
  Assuming η > 0]]
```

Solve: Equations may not give solutions for all "solve" variables.

Out[75]= $2\,u^2 - 4\,u\,\eta - 2\,\eta^2$