

In[7]:= **Seq** = 1 / (1 - z)

$$\text{Out[7]} = \frac{1}{1 - z}$$

In[9]:= **SeqNN** = z / (1 - z)

$$\text{Out[9]} = \frac{z}{1 - z}$$

In[10]:= **Pair** = SeqNN + Seq \* SeqNN

$$\text{Out[10]} = \frac{z}{(1 - z)^2} + \frac{z}{1 - z}$$

In[15]:= **Simplify[Solve[L == Seq \* Pair \* (M + SeqNN) && M == Pair \* L, {L, M}]]**

$$\text{Out[15]} = \left\{ \left\{ L \rightarrow -\frac{z^2 (2 - 3z + z^2)}{-1 + 5z - 6z^2 + 6z^3 - 4z^4 + z^5}, M \rightarrow \frac{(-2 + z)^2 z^3}{(-1 + z) (-1 + 5z - 6z^2 + 6z^3 - 4z^4 + z^5)} \right\} \right\}$$

In[30]:= **Series**[- $\frac{z^2 (2 - 3z + z^2)}{-1 + 5z - 6z^2 + 6z^3 - 4z^4 + z^5}$ , {z, 0, 20}]

$$\text{Out[30]} = 2z^2 + 7z^3 + 24z^4 + 90z^5 + 340z^6 + 1278z^7 + 4801z^8 + 18041z^9 + 67797z^{10} + 254773z^{11} + 957403z^{12} + 3597796z^{13} + 13520053z^{14} + 50806612z^{15} + 190924679z^{16} + 717470260z^{17} + 2696160482z^{18} + 10131822529z^{19} + 38074079209z^{20} + O[z]^{21}$$

In[31]:= **NSolve**[-1 + 5z - 6z^2 + 6z^3 - 4z^4 + z^5]

$$\text{Out[31]} = \left\{ \{z \rightarrow 0.0840263 - 1.07179i\}, \{z \rightarrow 0.0840263 + 1.07179i\}, \{z \rightarrow 0.266108\}, \{z \rightarrow 1.78292 - 0.269331i\}, \{z \rightarrow 1.78292 + 0.269331i\} \right\}$$

In[33]:= 1 / 0.26610814337287403`

$$\text{Out[33]} = 3.75787$$

In[22]:= **Simplify[Solve[L == Seq \* Pair \* (M + N) && M == SeqNN \* L && N == SeqNN \* L + z, {L, M, N}]]**

$$\text{Out[22]} = \left\{ \left\{ L \rightarrow \frac{z^2 (2 - 3z + z^2)}{1 - 4z + 2z^2 - 2z^3 + z^4}, M \rightarrow -\frac{(-2 + z)z^3}{1 - 4z + 2z^2 - 2z^3 + z^4}, N \rightarrow \frac{z(1 - 4z + 4z^2 - 3z^3 + z^4)}{1 - 4z + 2z^2 - 2z^3 + z^4} \right\} \right\}$$

In[29]:= **Series**[ $\frac{z^2 (2 - 3z + z^2)}{1 - 4z + 2z^2 - 2z^3 + z^4}$ , {z, 0, 20}]

$$\text{Out[29]} = 2z^2 + 5z^3 + 17z^4 + 62z^5 + 222z^6 + 793z^7 + 2835z^8 + 10136z^9 + 36238z^{10} + 129557z^{11} + 463189z^{12} + 1655982z^{13} + 5920426z^{14} + 21166561z^{15} + 75674167z^{16} + 270548416z^{17} + 967258026z^{18} + 3458117045z^{19} + 12363374793z^{20} + O[z]^{21}$$

In[32]:= **NSolve**[1 - 4z + 2z^2 - 2z^3 + z^4]

$$\text{Out[32]} = \left\{ \{z \rightarrow -0.0933358 - 1.36605i\}, \{z \rightarrow -0.0933358 + 1.36605i\}, \{z \rightarrow 0.279707\}, \{z \rightarrow 1.90696\} \right\}$$

In[34]:= 1 / 0.2797065609432023`

$$\text{Out[34]} = 3.57518$$