$$z = \begin{array}{c|c} a & b \\ \hline c & d \end{array}$$

$$\overbrace{I - z}^{-1} \underbrace{I + z}_{} = \begin{array}{c|c} \overbrace{1 - a - b\underbrace{1-d}_{-1}c}^{-1}\overbrace{1 + a + b\underbrace{1-d}_{-1}c}^{} & 2\overbrace{1 - a - b\underbrace{1-d}_{-1}c}^{-1} b \overbrace{1-d}^{-1} \\ \hline 2\overbrace{1 - d - c\underbrace{1-a}_{-1}b}^{-1} c \overbrace{1-a}^{-1} & \overbrace{1 - d - c\underbrace{1-a}_{-1}b}^{-1}\overbrace{1 + d + c\underbrace{1-a}_{-1}b}^{} \end{array}$$

$$\overbrace{1 + a + b\underbrace{1-d}_{-1}c}^{}\,\underbrace{1-a}_{} - 2b\underbrace{1-d}_{-1}c = \overbrace{1 - a - b\underbrace{1-d}_{-1}c}^{}\,\underbrace{1+a}_{}$$

$$2b - \overbrace{1 + a + b\underbrace{1-d}_{-1}c}^{}b = \overbrace{1 - a - b\underbrace{1-d}_{-1}c}^{}b$$

$$2c - \overbrace{1 + d + c\underbrace{1-a}_{-1}b}^{}c = \overbrace{1 - d - c\underbrace{1-a}_{-1}b}^{}c$$

$$\overbrace{1 + d + c\underbrace{1-a}_{-1}b}^{}\,\underbrace{1-d}_{} - 2c\underbrace{1-a}_{-1}b = \overbrace{1 - d - c\underbrace{1-a}_{-1}b}^{}\,\underbrace{1+d}_{}$$

$$\text{RHS}\ \underbrace{I - z}_{} = \text{RHS}\ \begin{array}{c|c} 1-a & -b \\ \hline -c & 1-d \end{array} =$$

$$\begin{array}{c|c} \overbrace{1 - a - b\underbrace{1-d}_{-1}c}^{-1}\left(\overbrace{1 + a + b\underbrace{1-d}_{-1}c}^{}\underbrace{1-a}_{} - 2b\underbrace{1-d}_{-1}c\right) & \overbrace{1 - a - b\underbrace{1-d}_{-1}c}^{-1}\left(2b - \overbrace{1 + a + b\underbrace{1-d}_{-1}c}^{}b\right) \\ \hline \overbrace{1 - d - c\underbrace{1-a}_{-1}b}^{-1}\left(2c - \overbrace{1 + d + c\underbrace{1-a}_{-1}b}^{}c\right) & \overbrace{1 - d - c\underbrace{1-a}_{-1}b}^{-1}\left(\overbrace{1 + d + c\underbrace{1-a}_{-1}b}^{}\underbrace{1-d}_{} - 2c\underbrace{1-a}_{-1}b\right) \end{array}$$

$$= \begin{array}{c|c} 1+a & d \\ \hline c & 1+d \end{array} = I + z$$

$$z = \begin{array}{c|c} a & 0 \\ \hline 0 & -a \end{array}$$

$$\overbrace{\not{I} - z}^{-1}\underbrace{\not{I} + z}_{} = \begin{array}{c|c} -a & 1 \\ \hline -1 & a \end{array}^{-1} \begin{array}{c|c} a & 1 \\ \hline -1 & -a \end{array} = \begin{array}{c|c} a\overbrace{1-a^2}^{-1} & \overbrace{a^2-1}^{-1} \\ \hline \underbrace{1-a^2}_{-1} & a\underbrace{a^2-1}_{-1} \end{array} \begin{array}{c|c} a & 1 \\ \hline -1 & -a \end{array}$$

$$= \begin{array}{c|c} \overbrace{1-a^2}^{-1}\overbrace{1+a^2}^{} & 2a\overbrace{1-a^2}^{-1} \\ \hline 2a\underbrace{1-a^2}_{-1} & \underbrace{1+a^2}_{}\underbrace{1-a^2}_{-1} \end{array}$$

$$z = \begin{array}{c|c} 0 & b \\ \hline b & 0 \end{array}$$

$$\overbrace{\mathcal{J} - z}^{-1} \underbrace{\mathcal{J} + z} = {\left(\begin{array}{c|c} 0 & 1-b \\ \hline -1-b & 0 \end{array}\right)}^{-1} \left(\begin{array}{c|c} 0 & b+1 \\ \hline b-1 & 0 \end{array}\right) = \left(\begin{array}{c|c} 0 & -\overbrace{1+b}^{-1} \\ \hline \underbrace{1-b}_{-1} & 0 \end{array}\right) \left(\begin{array}{c|c} 0 & b+1 \\ \hline b-1 & 0 \end{array}\right) = \left(\begin{array}{c|c} \overbrace{1+b}^{-1}\overbrace{1-b} & 0 \\ \hline 0 & \underbrace{1-b}_{-1}\underbrace{1+b} \end{array}\right)$$