

$$g_1 = C_{0000} + C_{1000} w_1 + C_{0100} w_2 + C_{0001} w_4$$

$$= a + d w_1 + c w_2$$

$$\frac{1}{z_3} f_2 = g_2$$

$$\frac{1}{z_3} b_{n_1 n_2 n_3 n_4} z_1^{n_1} z_2^{n_2} z_3^{n_3} z_4^{n_4} = d_{m_1 m_2 m_3 m_4} w_1^{m_1} w_2^{m_2} w_3^{m_3} w_4^{m_4}$$

$$= d_{m_1 m_2 m_3 m_4} \left(-\frac{z_1}{z_3}\right)^{m_1} \left(z_2 - \frac{z_1 z_4}{z_3}\right)^{m_2} \left(\frac{1}{z_3}\right)^{m_3} \left(\frac{z_4}{z_3}\right)^{m_4}$$

$$\frac{1}{z_3} f_2 = \frac{1}{z_3} (b_{0000} + b_{0001} z_4 + b_{0010} z_3)$$

$$= b_{0000} \frac{1}{z_3} + b_{0001} \frac{z_4}{z_3} + b_{0010}$$

$$\Rightarrow \textcircled{1} m_1 = m_2 = m_4 = 0 \quad m_3 = 1$$

$$d_{0010} \frac{1}{z_3} \Rightarrow d_{0010} = b_{0000}$$

$$\textcircled{2} m_1 = m_2 = m_3 = 0 \quad m_4 = 1$$

$$d_{0001} \frac{z_4}{z_3} \Rightarrow b_{0001} = d_{0001}$$

$$\textcircled{3} b_{0010} = d_{0000}$$

$$\Rightarrow g_2 = b + d w_3 + c w_4$$

Thus we get

$$f_1 = a + b z_1 + c z_2$$

$$f_2 = d + b z_3 + c z_4$$

$$g_1 = a + d w_1 + c w_2$$

$$g_2 = b + c w_4 + d w_3$$