$$\text{real genus } q = \frac{d_X + d_Y + d_V/2}{r} = 1 + a\,(r-1) + c + b/2$$

$$q - 1 = a\,(r-1) + c + b/2$$

$$2\,\varrho_j = \begin{cases} a\,(j-1) + c + b/2 \\ a\,(2j - r - 1)\,/2 = a\,(j-1) - a\,(r-1)\,/2 \end{cases}$$

$$2\,\varrho_j - a\,(j-1) = 1 + \frac{d_Y - d_X + d_V/2}{r}$$

$$2\,\varrho_j - a\,(j-1) = \begin{cases} c + b/2 = 1 + \dfrac{d_Y - d_X + d_V/2}{r} \\ -\dfrac{a}{2}\,(r-1) = 1 - \dfrac{d_X}{r} \end{cases}$$

$$\varrho_j - \frac{a}{2}\,(j-1) - d_Y/r - d_V/2r = \frac{1-q}{2}$$

$$2 \text{ LHS } = 1 + \frac{d_Y - d_X + d_V/2}{r} - 2\frac{d_Y + d_V/2}{r} = 1 - \frac{d_X + d_Y + d_V/2}{r} = 2 \text{ RHS}$$

$$\frac{\Gamma_{\nu - q\frac{}{2}1 + \varrho_j}\Gamma_{\nu - q\frac{}{2}1 - \varrho_j}}{\Gamma_{\nu - q\frac{}{2}1 + \lambda_j}\Gamma_{\nu - q\frac{}{2}1 - \lambda_j}} = \overset{\varrho_j - \lambda_j | \varrho_j + \lambda_j}{\underset{\nu - \mu + \varrho_j}{\boxed{1}}}$$

$$\prod_j \frac{\Gamma_{\nu - q\frac{}{2}1 + \varrho_j}\Gamma_{\nu - q\frac{}{2}1 - \varrho_j}}{\Gamma_{\nu - q\frac{}{2}1 + \lambda_j}\Gamma_{\nu - q\frac{}{2}1 - \lambda_j}} = \frac{\Gamma^\Omega_\nu \Gamma^\Omega_{\nu - d_Y/r - d_V/2r}}{\Gamma^\Omega_{\nu + \varrho - d_Y/r - d_V/2r + \lambda}\Gamma^\Omega_{\nu + \varrho - d_Y/r - d_V/2r - \lambda}}$$

$$\nu + 1\frac{}{2}q \pm \lambda_j = \nu + \varrho_j - a\,(j-1)\,/a - d_Y/r - d_V/2r \pm \lambda_j$$

$$\nu + 1\frac{}{2}q - \varrho_j = \nu - a\,(j-1)\,/2 - d_Y/r - d_V/2r$$

$$\nu + 1\frac{}{2}q + \varrho_j = \nu - a\,(r-j)\,/2$$

$$\Rightarrow \text{ LHS } = \prod_j \frac{\Gamma_{\nu - (r-j)\,a/2}\Gamma_{\nu - (j-1)\,a/2 - d_Y/r - d_V/2r}}{\Gamma_{\nu + \varrho_j - (j-1)\,a/2 - d_Y/r - d_V/2r + \lambda_j}\Gamma_{\nu + \varrho_j - (j-1)\,a/2 - d_Y/r - d_V/2r - \lambda_j}} = \text{ RHS}$$

$$\int_{dx}^{X} e + ix\,\Delta^{-\alpha}\; e - ix\,\Delta^{-\beta} = \frac{\Gamma_{\alpha + \beta - d_X/r}}{\Gamma_\alpha \Gamma_\beta}$$

$$\frac{\Gamma^\Omega_\nu \Gamma^\Omega_{\nu - d_Y/r - d_V/2r}}{\Gamma^\Omega_{\nu + \varrho - d_Y/r - d_V/2r + \lambda}\Gamma^\Omega_{\nu + \varrho - d_Y/r - d_V/2r - \lambda}}$$

$$= \frac{\Gamma^\Omega_\nu \Gamma^\Omega_{\nu - d_Y/r - d_V/2r}}{\Gamma^\Omega_{2\nu + 2\varrho - 2d_Y/r - d_V/r - d_X/r}} \frac{\Gamma^\Omega_{2\nu + 2\varrho - 2d_Y/r - d_V/r - d_X/r}}{\Gamma^\Omega_{\nu + \varrho - d_Y/r - d_V/2r + \lambda}\Gamma^\Omega_{\nu + \varrho - d_Y/r - d_V/2r - \lambda}}$$

$$= \frac{\Gamma^\Omega_\nu \Gamma^\Omega_{\nu - d_Y/r - d_V/2r}}{\Gamma^\Omega_{2\nu + 2\varrho - 2d_Y/r - d_V/r - d_X/r}} \int_{dx}^{X} e + ix\,\Delta^{-\nu - \varrho + d_Y/r + d_V/2r - \lambda}\; e - ix\,\Delta^{-\nu - \varrho + d_Y/r + d_V/2r + \lambda}$$

$$= \frac{\Gamma^\Omega_\nu \Gamma^\Omega_{\nu - d_Y/r - d_V/2r}}{\Gamma^\Omega_{2\nu + 2\varrho - 2d_Y/r - d_V/r - d_X/r}} \int_{dx}^{X} e + x^2\,\Delta^{-\nu}\; e + ix\,\Delta^{-\varrho + d_Y/r + d_V/2r - \lambda}\; e - ix\,\Delta^{-\varrho + d_Y/r + d_V/2r + \lambda}$$