$$P\,\hat{\underline{U}}_w P = \check{\underline{U}}_w$$

$$\frac{\Lambda_m^2}{(a/2)_m^2} = \frac{1}{(d/r)_m (ra/2)_m} \int_{dt}^{0|\infty} \mathcal{L}_t\, t^{2m-1} = \frac{\mu_{2m-1}}{(d/r)_m (ra/2)_m}$$

$$\overbrace{\beta_w \phi} \star_{\mu} \psi = -\underbrace{\Lambda\phi} \star_{\nu} \overbrace{\partial_w \underbrace{\Lambda\psi}}$$

$$\overbrace{\beta_w \phi} \star_{\mu} \psi - \phi \star_{\mu} \overbrace{\beta_w \psi} = \phi \star_{\mu} \hat{\underline{U}}_w \psi = \phi \star_{\mu} \check{\underline{U}}_w \psi = \overbrace{\partial_w \underbrace{\Lambda\phi}} \star_{\nu} \underbrace{\Lambda\psi} - \underbrace{\Lambda\phi} \star_{\nu} \overbrace{\partial_w \underbrace{\Lambda\psi}}$$

$${}^x\beta_w = c\,\underbrace{u|w} + \frac{{}^x\underline{\mathcal{L}}_u}{{}^x\mathcal{L}_u} u \overset{*}{w} x$$

$$\overbrace{\beta_w \phi} \star_{\mu} \psi = \int_{du}^{S_\ell} \int_{d_u^0\,(x)}^{\Omega_u} \left(c\,{}^x\mathcal{L}_u \underbrace{w|u} + {}^x\underline{\mathcal{L}}_u w_1 \overset{*}{u} x \right) {}^x\bar{\phi}\; {}^x\psi$$

$$\text{LHS} = \int_{du}^{S_\ell} \int_{d_u^0\,(x)}^{\Omega_u} {}^x\mathcal{L}_u\; {}^x\bar{\beta}_w\; {}^x\bar{\phi}\; {}^x\psi = \int_{du}^{S_\ell} \int_{d_u^0\,(x)}^{\Omega_u} {}^x\mathcal{L}_u\; \overbrace{c\,\underbrace{w|u} + \frac{{}^x\underline{\mathcal{L}}_u}{{}^x\mathcal{L}_u} w_1 \overset{*}{u} x}\; {}^x\bar{\phi}\; {}^x\psi = \text{RHS}$$

$$\ell = 1$$

$$\mu_n = \int_{dt}^{0|\infty} \mathcal{L}_t\, t^n$$

$$\int_{dt}^{0|\infty} \left(c\mathcal{L}_t - t\underline{\mathcal{L}}_t \right) t^{2m} = (2m + 1 + c)\; \mu_{2m}$$

$$-\int_{dt}^{0|\infty} t\,\underline{\mathcal{L}}_t\, t^{2m} = -\int_{dt}^{0|\infty} \underline{\mathcal{L}}_t\, t^{2m+1} = (2m+1) \int_{dt}^{0|\infty} \mathcal{L}_t\, t^{2m} = (2m+1)\; \mu_{2m}$$

$$\overparen{\beta_w \phi_m} \underset{\mu}{\star} \psi_{m+} = \mu_{2m} \frac{(2m+1+c)\,(a/2)_{m+}}{(d/r)_{m+}(ra/2)_{m+}} \phi_m \underset{Z}{\star} \overparen{\partial_w \psi_{m+}}$$

$${}^{tu}\mathcal{L}_u = \mathcal{L}_t \Longrightarrow \underset{-}{\mathcal{L}}_t = {}^{tu}\mathcal{L}_u u\colon \quad w_1 \overset{*}{u}(tu) = t\, \underbrace{w|u}\, u$$

$$\text{LHS} = \int_{dt/t}^{0|\infty} \int_{du}^{S_1} \left(c\, {}^{tu}\mathcal{L}_u \underbrace{w|u} + {}^{tu}\underset{-}{\mathcal{L}}_u w_1 \overset{*}{u}(tu) \right) {}^{tu}\bar{\phi}\, {}^{tu}\psi$$

$$= \int_{dt/t}^{0|\infty} \left(c\mathcal{L}_t + t\underset{-}{\mathcal{L}}_t \right) \int_{du}^{S_1} \underbrace{w|u}\, {}^{tu}\bar{\phi}_m\, {}^{tu}\psi_{m+} = \int_{dt}^{0|\infty} \left(c\mathcal{L}_t + t\underset{-}{\mathcal{L}}_t \right) t^{2m} \int_{du}^{S_1} \underbrace{w|u}\, {}^{u}\bar{\phi}_m\, {}^{u}\psi_{m+}$$

$$= (2m+1+c)\, \mu_{2m} \overparen{\ell_w \phi_m} \underset{S_1}{\star} \psi_{m+} = \mu_{2m} \frac{(2m+1+c)\,(a/2)_{m+}}{(d/r)_{m+}(ra/2)_{m+}} \overparen{\ell_w \phi_m} \underset{Z}{\star} \psi_{m+} = \text{RHS}$$

$$\mu_{2m+1}\, \mu_{2m-1} = \frac{(2m+c+1)^2}{(m+d/r)\,(m+ra/2)} \mu_{2m}^2$$

$$\mu_{2m} \frac{(2m+1+c)\,(a/2)_{m+}}{(d/r)_{m+}(ra/2)_{m+}} \phi_m \underset{Z}{\star} \overparen{\partial_w \psi_{m+}} = \overparen{\beta_w \phi_m} \underset{\mu}{\star} \psi_{m+} = \underbrace{\Lambda \phi_m} \underset{a/2}{\star} \overparen{\partial_w \underbrace{\Lambda \psi_{m+}}} = \frac{\Lambda_m \Lambda_{m+}}{(a/2)_m} \phi_m \underset{Z}{\star} \overparen{\partial_w \psi_{m+}}$$

$$\Longrightarrow \frac{(2m+1+c)\,\mu_{2m}}{(d/r)_{m+}(ra/2)_{m+}} = \frac{\Lambda_m \Lambda_{m+}}{(a/2)_m (a/2)_{m+}} = \frac{\mu_{2m-1}^{1/2}}{(d/r)_m^{1/2}(ra/2)_m^{1/2}} \frac{\mu_{2m+1}^{1/2}}{(d/r)_{m+}^{1/2}(ra/2)_{m+}^{1/2}}$$

$$\frac{(2m+1+c)\,\mu_{2m}}{\mu_{2m-1}^{1/2}\mu_{2m+1}^{1/2}} = \frac{(d/r)_{m+}^{1/2}(ra/2)_{m+}^{1/2}}{(d/r)_m^{1/2}(ra/2)_m^{1/2}} = \sqrt{m+d/r}\sqrt{m+ra/2}$$

$$\frac{(\alpha)_{m+}}{(\alpha)_m} = \alpha + m$$