<u>Bailey's Transform</u> (subject to suitable convergence conditions) if

$$\beta_n = \sum_{r=0}^{n} \alpha_r \, u_{n-r} \, v_{n+r}$$

and

$$\gamma_n = \sum_{r=n}^{\infty} \delta_r \, u_{r-n} \, v_{r+n}$$

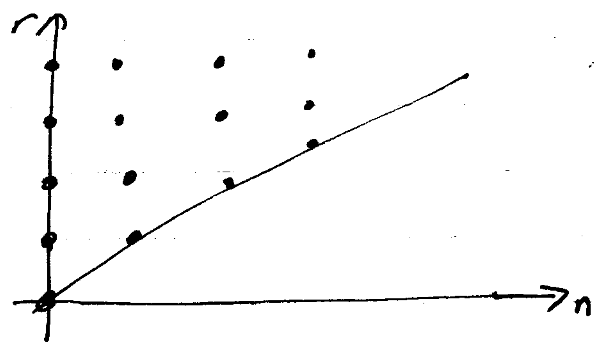
then

$$\sum_{n=0}^{\infty} \alpha_n \gamma_n = \sum_{n=0}^{\infty} \beta_n \delta_n .$$

<u>Proof:</u>

$$\sum_{n=0}^{\infty} \alpha_n \gamma_n = \sum_{n=0}^{\infty} \alpha_n \sum_{r=n}^{\infty} \delta_r \, u_{r-n} \, v_{r+n}$$

$$= \sum_{n=0}^{\infty} \sum_{r=n}^{\infty} \alpha_n \, \delta_r \, u_{r-n} \, v_{r+n}$$



$$= \sum_{r=0}^{\infty} \sum_{n=0}^{r} \alpha_n \, \delta_r \, u_{r-n} \, v_{r+n}$$

$$= \sum_{r=0}^{\infty} \delta_r \sum_{n=0}^{r} \alpha_n \, u_{r-n} \, v_{r+n}$$

$$= \sum_{r=0}^{\infty} \delta_r \beta_r = \sum_{n=0}^{\infty} \delta_n \beta_n . \qquad \square$$