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Research Article

Some bilinear generating functions for Jacobi polynomials

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In a previous paper (3) the writer has proved

$$\sum_{n=0}^{\infty} \binom{m+n}{m} P_{m+n}^{(\alpha-n, \beta-n)}(x) t^n = [1 + \frac{1}{2}(x+1)t]^\alpha [1 + \frac{1}{2}(x-1)t]^\beta P_m^{(\alpha, \beta)}[x + \frac{1}{2}(x^2-1)t], \quad (1.1)$$

$$\sum_{n=0}^{\infty} \frac{(\lambda)_n}{(\mu)_n} (y-x)^n P_n^{(\alpha-n, \beta-n)}\left(\frac{x+y}{x-y}\right) = F_1(\lambda; -\alpha, -\beta; \mu; x, y), \quad (1.2)$$

where $P_n^{(\alpha, \beta)}(x)$ is a Jacobi polynomial defined as ((4) p.255)

$$P_n^{(\alpha, \beta)}(x) = \frac{(1+\alpha+\beta)_{2n}}{n!(1+\alpha+\beta)_n} \left(\frac{x+1}{2}\right)^n {}_2F_1\left[\begin{matrix} -n, -\beta-n; \\ -\alpha-\beta-2n; \end{matrix} \frac{2}{x+1}\right]. \quad (1.3)$$

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