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CONSTRUCTIVE APPROXIMATION

Erratum: Christoffel Functions, Orthogonal Polynomials, and Nevai's Conjecture for Freud Weights

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There is an oversight in the proof of Corollary 1.2(a) in the above paper as effectively the proof on pages 517ff. only shows that

$$1 - x_{1n}/a_n \leq Cn^{-2/3}$$

(The oversight occurs in (11.2) on page 518 in taking absolute values through the inf sign). This is actually the more difficult part of Corollary 1.2(a). For the (easier) converse inequality, one needs the following: If $K > 0$ is large enough, then for n large enough and $R \in \mathcal{P}_{2n}$, we have

$$\int_{|x|\geq a_n(1+Kn^{-2/3})} |R|W^2(x)\,dx \leq \frac{1}{2}\int_{|x|\leq a_n(1+Kn^{-2/3})} |R|W^2(x)\,dx.$$

This follows using the method of proof of Theorem 1.8 (pp. 513–514) and the estimate (7.14) (p. 486). Hence for $P \in \mathcal{P}_{2n-2}$, with $P \geq 0$,

$$\int_{-\infty}^{\infty} \left[a_n\left(1 + Kn^{-2/3}\right) - x\right]\left(PW^2\right)(x)\,dx$$
$$\geq \frac{1}{2}\int_{|x|\leq a_n(1+K\delta_n)} \left[a_n\left(1 + Kn^{-2/3}\right) - x\right]\left(PW^2\right)(x)\,dx \geq 0.$$

Then

$$a_n\left(1 + Kn^{-2/3}\right) - x_{1n}$$
$$= \inf_{\substack{P\in\mathcal{P}_{2n-2}\\ P\geq 0}} \int_{-\infty}^{\infty} \left[a_n\left(1 + Kn^{-2/3}\right) - x\right]\left(PW^2\right)(x)\,dx \Big/ \int_{-\infty}^{\infty}\left(PW^2\right)(x)\,dx \geq 0.$$

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Thus

$$1 - x_{1n}/a_n \geq -C_1 n^{-2/3},$$

completing the proof of Corollary 1.2(a).

Reference

1. A. L. LEVIN, D. S. LUBINSKY (1992): *Christoffel Functions, Orthogonal Polynomials, and Nevai's Conjecture for Freud Weights*, Constr. Approx., **8**:463–535.

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