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A generic formula for the values at the boundary points of monic classical orthogonal polynomials. (English summary)

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In this paper the authors obtain a generic polynomial solution for the second-order differential equation

$$(a\,x^2+b\,x+c)\,y_n''(x)+(d\,x+e)y_n'(x)-n((n-1)a+d)\,y_n(x)=0,$$

for $n\in\mathbb{N}$. This new expression for the monic polynomial solutions, $\overline{P}_n$, to the previous differential equation is given by formula (27) in the article. To obtain this expression for $\overline{P}_n$, the authors use another representation of $\overline{P}_n$ obtained in [W. A. Koepf and M. Masjed-Jamei, Integral Transforms Spec. Funct. **17** (2006), no. 8, 559–576; MR2246501], the Rodrigues formula for $\overline{P}_n$, and several simplifications of hypergeometric expressions. As an application of this expression of $\overline{P}_n$, well-known values of the classical orthogonal polynomials (Jacobi, Laguerre, Hermite and Bessel) at the boundary points are obtained.

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