Laguerre polynomials

Verify

$$x\frac{d^2}{dx^2}L_n^\alpha(x) + (\alpha + 1 - x)\frac{d}{dx}L_n^\alpha(x) + nL_n^\alpha(x) = 0$$

where $L_n^\alpha(x)$ are associated Laguerre polynomials

$$L_n^\alpha(x) = \frac{e^x}{x^\alpha n!}\frac{d^n}{dx^n}(x^{n+\alpha}e^{-x})$$

For integer α the following formula can be used.

$$L_n^\alpha(x) = (n+\alpha)!\sum_{k=0}^{n}\frac{(-x)^k}{(n-k)!(\alpha+k)!k!}$$