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About derivatives in analytic QCD

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We consider ν-derivatives and (analytic analogs of) ν-powers in the case of usual and minimal analytic (MA) versions of QCD. We use the integer case $\nu = n = 1; 2; 3; 4$ and apply it to the study of the Bjorken sum rule. All results are presented up to the 4th order of perturbation theory, where the corresponding Wilson coefficients d_i $(i = 1, 2, 3)$ for the Bjorken sum rule are known.

It is shown that the results based on the usual perturbation theory do not agree with the experimental data at $Q^2 \leq 1.5\,\text{GeV}^2$. The MA perturbation theory leads to good agreement with the experimental data when we used the "massive" version for high-twist contributions. The results based on derivatives and (analytic analogs of) powers of usual and MA coupling constants are very similar each other. In the case of MA QCD, the use of derivatives strongly simplifies the study.

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