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Let \mathcal{P}_n be the class of polynomials of degree at most n and $\|\cdot\|$ be the *sup norm* on the unit circle. For $p \in \mathcal{P}_n$, S. N. Bernstein proved

$$\|p'\| \leq n\|p\| ; \tag{1}$$

and the *Bernstein lemma* is

$$\max_{|z|=R>1} |p(z)| \leq R^n \|p\|. \tag{2}$$

By restricting the zeros of $p(z)$ to $|z| > 1$, (1) and (2) both can be improved. The improvement of (1) is due to Erdős and Lax and that of (2) is due to Ankeny and Rivlin. We generalize latter's result for the space \mathcal{R}_n of rational functions with prescribed poles.

Moreover, for $p \in \mathcal{P}_n$ with $\|p\| = 1$, by restricting zeros of $p(z)$ to $|z| < 1$, Turán obtained a reverse inequality to that of Erdős and Lax. By further restricting zeros of $p(z)$ to regions $|z| \geq K$ with $K \geq 1$, Malik and Govil had proved Erdős-Lax and Turán type inequalities. We present our preliminary results of rational analogues to these inequalities.

Furthermore, in working towards our main results, we established several auxiliary results which may be of interest in their own. (Received September 13, 2017)