56PTNMB7

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§1 Solution

Solution. Let S_1, S_2 be the sets of roots of $P, P+1$. If a root has multiplicity m then P' has $m-1$. This means,

$$(\deg(P) - |S_1|) + (\deg(P+1) - |S_2|) \leq \deg(P')$$

$$\deg(P) + 1 \leq |S_1| + |S_2|$$

$$\deg(Q) + 1 \leq |S_1| + |S_2|$$

Now, $\max(\deg(P), \deg(Q)) \geq \deg(P - Q) \geq |S_1| + |S_2| \geq \max(\deg(P), \deg(Q)) + 1$, which is not possible unless $P = Q$. $\qquad\square$