Dummit & Foote Ch. 3.2: More on Cosets and Lagrange's Theorem

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Let G be a group.

1. (10/1/23)

Which of the following are permissible orders of subgroups of a group of order 120: 1, 2, 5, 7, 9, 15, 60, 240? For each permissible order give the corresponding index.

Proof. From Lagrange's theorem, the order of a subgroup of a group of order 120 must divide 120. Then the permissible orders for subgroups are $1 = \frac{120}{120}$, $2 = \frac{120}{60}, 5 = \frac{120}{24}, 15 = \frac{120}{8}$, and $60 = \frac{120}{2}$. For each of these orders the index is given by the corresponding denumerator. $\square$