

Math 317 Section B1 Quiz 5 (with solution)

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Problem 1.

Let $G = S_n$ be the symmetric group where $n \geq 3$. Let T be the set of all transpositions in S_n and let

$$H := \{1\} \cup T$$

Is H a subgroup of G ? Justify your answer.

Solution.

Since $n \geq 3$, we have $1, 2, 3 \in \{1, 2, \dots, n\}$. Thus $(12) \in H$ and $(23) \in H$. However $(12)(23) = (123) \notin H$, since (123) is a 3-cycle and not a transposition. Hence H is not closed under multiplication and therefore H is not a subgroup of S_n .