1. Adversary $A$ attacks the MAC $F : K \times M \rightarrow \{0,1\}^t$. It asks a query $M_1$ and gets back a tag $T_1 = F_K(M_1)$; then it asks a query $M_2$ and gets back a tag $T_2 = F_K(M_2)$. Adversary $A$ then outputs a pair $(M_3, T_3)$ and halts. Adversary $A$ is said to forge (or win) if the following conditions hold:

Be succinct and precise. Your answer is the AND of some Boolean conditions. Use the named variables and not English.

2. From MT.1: How many possible cycles are there on $\{0,1\}^8$, the space of 1-byte strings?

A cycle $C : S \rightarrow S$ on a finite set $S$ is a permutation $C$ for which $S = \{x, C(x), C(C(x)), \ldots\}$ for any $x \in S$. 