

Party Theorem

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Theorem 1: In every group of 6 people there are always

① 3 mutual friends, or

② 3 mutual strangers

Proof. Take any person from the group.

④ Suppose she has ≥ 3 friends $A, B, C \dots$

If any pair from $\{A, B, C\}$ are friends we have ①
Otherwise $\{A, B, C\}$ satisfy ②

⑤ If she does not have ≥ 3 friends then she has ≥ 3 people she does not know, say $A, B, C \dots$

Again if any pair from $\{A, B, C\}$ are strangers we have ②

Otherwise $\{A, B, C\}$ are all friends and we have ①. □

As we saw, both ① and ② can happen at the same time.

Eg.

