We worked out Missionaries & Cannibals Problem in the class. It is defined as follows:

Three missionaries and three cannibals must cross a river using a boat which can carry at most two people, under the constraint that, for both banks, if there are missionaries present on the bank, they cannot be outnumbered by cannibals (if they were, the cannibals would eat the missionaries). The boat cannot cross the river by itself with no people on board. (Wikipedia)

There are multiple variants of this problem. They vary with respect to the number of missionaries & cannibals and capacity of the boat.

Show that if the boat holds 2 people, then 2 missionaries & cannibals variant require 5 trips; and with 4 or more missionaries & cannibals, the problem has no solution.

Also, if the boat can hold 3 people, then up to 5 missionaries & cannibals can cross; if the boat can hold 4 people, any number of missionaries & cannibals can cross.

Another variant is as follows. If an island is added in the middle of the river, then any number of missionaries & cannibals can cross using a two-person boat.