

A Puzzle About Airline Drinks

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Bob and Denise, a loving couple, get on a plane that is so small that it has only four rows of seats, with a single seat in each. Bob takes the seat in row 2, and Denise takes the seat in row 4. They are followed by Andrew and Carol, another loving couple, seated in rows 1 and 3, respectively. From the look that Andrew gives Carol before she heads down to her own seat, Bob recognizes that, like himself, Andrew is the type of man that always places his wife's preferences before his own. Specifically, both husbands will behave in such a self-sacrificing way as long as it can be reasonably believed that there is a chance that this will help their wives, and there is no chance that it will hurt their wives. Other than this, Bob and Denise know nothing about Andrew and Carol, and vice versa—but of course each husband knows his own wife well.

Shortly after takeoff, the plane encounters some mild turbulence, and the passengers must keep their seatbelts tightly fastened for the remainder of the trip. The small plane is also very noisy. But, the passengers can still see what happens in front of them. The airline hostess manages to regularly come by with some drinks; every time, she brings four drinks, which the passengers take as she moves from the front (row 1) to the back (row 4).

The first time, she is carrying two cups of coke and two cups of orange juice. Andrew takes a coke, Bob takes a coke, Carol takes an orange juice, and Denise takes an orange juice.

The second time, she is carrying three cups of coke and one cup of orange juice. Andrew takes a coke, Bob takes an orange juice, Carol takes a coke, and Denise takes a coke.

The third time, she is carrying one cup of coke, one cup of orange juice, and two cups of water. Andrew takes an orange juice, Bob takes a coke, Carol takes a water, and Denise takes a water.

The fourth time, she is carrying three cups of orange juice and one cup of water. Andrew takes an orange juice, Bob takes a water, Carol takes an orange juice, and Denise takes an orange juice.

The fifth (and final) time, she is carrying one cup of orange juice and three cups of water. Andrew takes a water, Bob takes an orange juice, Carol takes a water, and Denise takes a water.

Assume that each passenger has strict and unchanging preferences over coke, orange juice, and water. (For example, a passenger may prefer orange juice to coke to water.) What are each passenger's preferences?