

## Retail café

You are the operations manager of a retail café company that operates four branches within a single mall: Bucks, Negro, Taste, and Flower. Each store can receive up to 150 product units daily and must maintain a minimum stock of 100 units. The purchase department provides a reception plan, while the sales department forecasts the expected daily aggregated demand:

	Reception [unit]	Sales [unit]
Monday	550	250
Tuesday	500	250
Wednesday	500	300
Thursday	500	450
Friday	550	550
Saturday	550	700
Sunday		650

The daily sales in each store are directly proportional to the daily deliveries received. The only exception is Sundays, when the sales are determined by the total accumulated stock minus the required minimum stock level. This minimum stock level is the starting point for each store's inventory on Mondays. The profit margin for each store is 0.6€/unit in Bucks, 0.8€/unit in Negro, 0.9€/unit in Taste, and 0.7€/unit in Flower. In addition, you count on four high-ranked waiters who generate extra earnings through tips and are already assigned to a base store. Their daily wage, how much they increase the profit margin, and the extra cost from transferring to another store are as follows:

	Wage [€/day]	Extra profit [%]	Extra cost [€/day]
Emily – Bucks	100	18	30
John – Negro	150	25	45
Sarah – Taste	120	22	36
Mike – Flower	110	20	33

The union mandates that no waiter can work more than three days per week in the same store. Each waiter must also take one day off but must be hired for at least four days.

Your objective is to optimize the allocation of units across these stores and efficiently route your waiters throughout the stores, including when they take days off. To facilitate your decisions, the number of units of product does not need to be an integer.

After elaborating your plan, the human resources department, which is highly attentive to employee well-being and has conducted a survey to optimize staff satisfaction, communicates the following conditions:

- John and Mike are roommates and insist on working on the same days.
- If Emily stays at Bucks, Sarah insists on staying at Taste.

How do both conditions modify the schedule? How much does it cost?