

Optimization of Car Purchase for Taxi Service

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In the Czech Republic, the owner of Prague's taxi service is considering whether to buy additional cars and how many to buy in order to maximize his profit. Currently, he has 3 cars, each earning an average monthly income of 60 000 CZK. However, based on years of experience in the industry, he expects that with each additional car purchased, the average income per car will decrease by 5 000 CZK due to a partial shift of customers to the new car. He also needs to consider that the costs for a driver and a car amount to 40 000 CZK per month.

Exercise 1. What is the monthly profit of the taxi service owner currently?

Exercise 2. Determine the function that expresses the profit of the taxi service owner as a function of the number of newly purchased cars. What type of function is it, and what does its graph look like?

Exercise 3. Determine the owner's maximum possible profit. How much does this profit differ from the current profit? How many cars does the owner have to buy (or possibly sell)?