A Repair Shop:
Another Dynamic Simulation Model

The Gotham Taxi Company has a fleet of 500 taxicabs. On any given day of use, a taxi has a 0.4% chance of breaking down. Broken-down taxis are towed overnight to the company repair shop. They return to service the day after they are fixed. Each day a taxi spends in the shop costs the company $350 in lost profits.

There are three mechanics Gotham is considering hiring to work in the repair shop: Larry, Moe and Curly. Each can fix one to three taxis per day.

Larry would cost the company $300 per day. On any given day, there is 20% probability he can only fix one taxi, and a 40% probability he will be able to fix either two or three.

Moe costs $250 per day. He has an equal probability of being able to fix either one, two or three taxis on any given day.

Curly costs $200 per day. On any given day, there is a 50% chance he can fix only one cab, a 30% chance he will be able fix two, and a 20% chance that he will be able to fix three.

The company may hire any combination of the three mechanics: any one, any two or all three. Explain why you can tell, prior to performing any simulation, that the option of hiring just Curly will not be workable. Simulate each possibility by 200 trials of 100 days each. Which possibility gives them the lowest average cost? What is the average number of taxis in the shop when you adopt this policy?