Airline Overbooking:
Another Example Simulation Problem

You are taking reservations for an airline flight. This particular flight uses an aircraft with 50 first-class seats and 190 economy-class seats.

First-class tickets on the flight cost $600, with demand to purchase them distributed like a Poisson random variable with mean 50. Each passenger who buys a first-class ticket has a 93% chance of showing up for the flight. If a first-class passenger does not show up, he or she can return their unused ticket for a full refund. Any first-class passengers who show up for the flight with tickets but are denied boarding are entitled to a full refund plus a $500 inconvenience penalty.

Economy tickets cost $300. Demand for them is Poisson distributed with a mean of 200, and is independent of the demand for first-class tickets. Each ticket holder has a 96% chance of showing up for the flight, and "no shows" are not entitled to any refund. If an economy ticket holder shows up and is denied a seat, however, they get a full refund plus a $200 penalty. If there are free seats in first-class and economy is full, economy ticket holders can be seated in first-class.

The airline allows itself to sell somewhat more tickets than it has seats. This is a common practice called "overbooking". The firm is considering the 18 possible polices obtained through all possible combinations of

- Allowing overbooking of up to 0, 5, or 10 first-class seats
- Allowing overbooking of up to 0, 5, 10, 15, 20, or 25 economy seats

Which option gives the highest average profit? What are the average numbers of first-class and economy passengers denied seating under this policy. If no overbooking of first-class is allowed, what is the best policy?