A tour operator has a bus that can accommodate 20 tourists. The operator knows that tourists may not show up, so he sells 21 tickets. The probability that an individual tourist will not show up is 0.02, independent of all other tourists. Each ticket costs 50, and is non-refundable if a tourist fails to show up. If a tourist shows up and a seat is not available, the tour operator has to pay 100 (ticket cost + 50 penalty) to the tourist. What is the expected revenue of the tour operator?

A. 935    B. 950    C. 967    D. 976    E. 985

Solution.
The bus driver collects $21 \cdot 50 = 1050$ for the 21 tickets he sells. But he may have to refund 100 to one passenger if all 21 ticket-holders show up. Since passengers are independent of one another, the probability that all 21 passengers will show up is $(1 - 0.02)^{21} = 0.98^{21} \approx 0.65$. Therefore, the tour operator’s expected revenue is $1050 - 100 \cdot 0.65 = 985$.

Answer E.

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