Duration: 5:15 to 5:30 pm   **Maximum marks: 5**

Join zoom meeting (same as that of the class) with camera on.

<u>Instructions</u>: *Write your answer on white paper, take its photo at the end of this part of the exam (5:30 pm), create a pdf and submit it via mookit, which would accept submissions till 5:40 pm. In case you have difficulty accessing mookit, you shall email or whatsapp me the pdf. Don't use multiple channels for answer submission. Answers received after 5:40 pm will attract heavy penalty, and those received after 5:45 pm will not be considered for grading. Hand-written answers on digital writing pad will be accepted*.

_____

1. A taxi driver provides service around a major road in a city. There are $k \geq 2$ zones along the road, numbered $1, 2, \ldots, k$ from one end of the road to the other. Fares picked up in zone i will have destinations in zone i with probability $\lambda \in (0,1)$ and in zone $j \neq i$ with probability $(1 - \lambda)/(k - 1)$. The driver's expected profit for a trip from zone i to zone j is $\alpha + \beta|j - i|$. Show that the long-run average profit per trip is $\alpha + (1 - \lambda)\beta\,(k + 1)/3$. Start with Markov chain modelling and mention all the results you are using.   [Marks: 5]

Hint: This should not be difficult if you were following the homework. For the Markov chain modelling, just mention meaning of X_n and construct the transition probability matrix.