HL MATHEMATICS IA

Overbooking of Restaurants

Personal Code: hlq361

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1. Introduction

1.1 Rationale

During my summer break last year, I worked at my uncle's restaurant as a waitress. His restaurant, Mischief, was especially crowded during dinner, and often many reservations were placed days or weeks in advance. The restaurant also serves as a bar at night, which increased the capacity the restaurant could hold if needed. I was taught to take in more reservations than the restaurant could actually fit, this confused me as I never understood the reason behind overbooking of reservations. Only recently, have I come across reasons for overbooking of flights or hotels, but not much related to restaurants, as overbooking of restaurant reservations are less risky as compared to flights and hotel stays. Using the same principle as probability that not all reservations will show up. I am curious to find out more on the benefits restaurants gain from overbooking reservations.

1.2 Aim

I will therefore be investigating the optimal overbooking reservations it can make in attempt to maximize revenue for each day that it takes reservations for.

1.3 Overbooking Problem in Restaurants

Overbooking is a frequent occurrence that is common in airline industries, hotel managements and even in reservations in restaurants. However, there is a difference between the restaurant, hotel and airline industries in the way they handle overbooking and no-shows. Although restaurants have capacity limits, they often do not bump customers as compared to the hotel and airline industry. Hotel and airline industries also have to pay a much higher cost if more customers show up than anticipated, i.e. pay a cost for rejecting the customer. For example, in airline industries, in the event of more passengers showing up than expected which results in bumping, this cost the industry expensive vouchers, paid hotel stays and airplane ticket for next available flight.

A restaurant has the ability to stretch the seating capacity. This means that a restaurant may have 2 capacity limits:
1. A profitable seating capacity in which the customers would find comfortable
2. A stretched seating capacity. The restaurant would only have to reject customers if they continue to arrive beyond the stretched capacity.

In order to study the overbooking of the restaurant industry, I obtained data of business situation in my uncle's restaurant, Mischief, of over one year and noted how demand exceeded supply on a regular basis, after analyzing the reservation data. The data consist of total daily number of reservations and no shows during dinner time. I was then able to improve on and use previous conceptual models and equations to determine the booking limit for maximizing the expected total revenue.