Question 1:

a).

FCFS daily revenue: £ 3592.00

b).

Regular Arrival Protection: 14

Expected Daily Revenue: £ 4066.50

% improvement: 13.21%

c).

- The allocation decision increases when **regular demand** increases and decreases when regular demand decreases.
- When the **price of early reservations** decreases, the protection level increases. And when the price increases, the protection level decreases.
- The allocation does not change with changes to the **price of regular reservations**.
  - (Assuming the **discounted rate** % remains the same)
- Without simultaneously changing discounted rate, allocation and **regular price** have a direct relationship
- No changes in allocation with changes to **capacity**
- No change with changes to **early demand**.

The relationship between the above variables and allocation is logical. I would expect the regular demand and price of regular reservation to have a direct relationship with allocation. It is also expected that price of early reservations would have an inverse relationship when attempting to maximize profits because it is necessary to maintain availability for higher fare customers, so as the lower fare approaches the higher fare the allocation will fall to accommodate the higher demand of early reservations.

Question 2:

a).

50 leg 1 seats available, 50 leg 2 seats available, 100 time periods remaining

b).

        The structure indicates that there is a desire to protect the balance of product 1 and product 2 by rejecting sales when the capacity of p1 and p2 becomes unbalanced. It is important to balance the capacity of the two products because they must both be available for product 3 to be sold, especially at t=100 when there is still a lot of time to sell p3

c).

        First, I would need to include the new product's price (£200) and arrivalprob (1/20) in the respective vectors. Next, I would add a new array to track the acceptance decision for the new product. I would also modify the dynamic programming algorithm to incorporate the new product by adding a decision block that checks if the available capacity can accommodate it. Lastly, I would update the overall value function to include the new product's expected contribution based on its arrival probability.

Question 3:

        A relatable setting to apply class concepts is my hometown barber. He operates independently within a barber shop owned by a separate entity, he pays a fee to use the space. My barber offers various services, like haircuts or beard trimming, with different time requirements and prices for each.

        By applying linear programming (LP) to his scheduling, he could find the optimal number of services to offer within a given time. Constraints used to find feasible solutions would include service availability, his working hours, demand insights, and non-negative values. The LP outcome could also guide dynamic programming (DP) to reduce his downtime, manage client scheduling, and use dynamic pricing during off-peak hours.