**OMIS 6000 Assignment 2**

**Question 1**

1. Results from KKT method: Advanced model price**: $2296.50**, Basic model price: **$383.85**
2. Results from gradient descent algorithm: Advanced model price: **$2296.50**, Basic model price: **$383.85**

The results of both approaches are the same, indicating that our gradient descent settings were adequately set to find the global optimal solution.

1. The optimal revenue is: **$718,381,987.85**
2. With these new constraints in place, the optimal revenue is unchanged: **718,381,987.85**
3. The prices are unchanged between the two models since the original model already happened to follow this pricing logic. However, it would still make sense to incorporate this new constraint, since, if an older product is more expensive than a newer product, there could be negative impacts on the demand of that older product as it may be perceived as overpriced. Additionally, there could be negative impacts on demand of newer products if they’re cheaper than older products, as they may be seen as lower quality/lower performance. This is something that would need to be considered.
4. The model currently does not account for cost of producing or selling these products and is only concerned with revenue generation. The pricing strategy should take cost of production into account to ensure sales are profitable. Optimizing for maximum profit rather than revenue would make the most realistic business sense.

**Question 1**

1. This is a personnel selection problem; thus the decision variable is binary, 0 or 1. 1 if a player is invited to the training camp and 0 if they’re not.
2. There should be a total of 150 decision variables, one binary decision per potential player.
3. The objective function is to maximize the sum of the average skill of the players included on the training team. It must be a sum of the averages, and not a maximization of overall average skill, as this would not be linear. The sum of average skill per player is a linear problem, and the objective function would ensure the team maximizes the level of skill included on the training team.
4. X72 <= 1 – sum(X20 + X21 + X22 + X23 + X24)
5. Let Gi be binary value if guard position or not and let Xi be binary value if included on training team or not:

Gi Xi  >= 0.3\*sum(Xi)

1. What is the optimal objective function value?
2. How many guards (G, G/F) are invited to the training camp?
3. What is the smallest number of training camp invitations that can be sent before the model yields an infeasible solution? What constraint(s) cannot be satisfied?
4. Describe (do not implement) the challenge of modifying your solution approach to ensure that players with a total score of 12 or under would not be invited to training camp.
5. What do you perceive as a problem with Victor’s approach of choosing participants?