**Big Mountain Resort (Problem Summary)**

**Data wrangling :**

1. We can see after loading the data there are a total 27 columns and 330 rows in our DataFrame. There are total 38 Region and 35 states.
2. By the Distribution Of Resorts By Region and State we have found Our target resort is in Montana, comes in at 13th place.
3. After the data wrangling we can see that we have a total 277 rows and 25 columns in our DataFrame and we saved these data to our directory.

**Exploratory Data Analysis:**

1. We have uploaded the ski\_data\_cleaned.csv and state\_summary.csv for the exploratory data analysis There are a total 25 columns and 277 rows in ski\_data and 8 columns and 35 rows in state\_summary data. There are a total of 22 numerical and 3 categorical columns in ski\_data DataFrame and 7 numerical and 1 categorical column is in state\_summary DataFrame.
2. By seeing the ratio of chairs to runs, It seems that the more chairs a resort has to move people around, relative to the number of runs, ticket price rapidly plummets and stays low. What we may be seeing here is an exclusive vs. mass market resort effect; if we don't have so many chairs, we can charge more for our tickets, although with fewer chairs we’re inevitably going to be able to serve fewer visitors. Our price per visitor is high but our number of visitors may be low.
3. It also appears that having no fast quads may limit the ticket price, but if Our resort covers a wide area then getting a small number of fast quads may be beneficial to ticket price.

**Preprocessing and Training:**

1. In Preprocessing and training stage After performing preliminary assessments of data quality and refining the question to be answered. We found a small number of data values that gave clear choices about whether to replace values or drop a whole row. We determined that predicting the adult weekend ticket price was our primary aim.
2. We found that the random forest model has a lower cross-validation mean absolute error by almost $1. It also exhibits less variability. Verifying performance on the test set produces performance consistent with the cross-validation results.

**Modelling:**

Big Mountain Resort modelled price is $94.22, actual price is $81.00. Even with the expected mean absolute error of $10.39, this suggests there is room for an increase.

The business has shortlisted some options:

(a) Permanently closing down up to 10 of the least used runs. This doesn't impact any other resort statistics.

(b) Increase the vertical drop by adding a run to a point 150 feet lower down but requiring the installation of an additional chair lift to bring skiers back up, without additional snow making coverage.

(c) Same as step b, but adding 2 acres of snow making cover.

(d) Increase the longest run by 0.2 mile to boast 3.5 miles length, requiring an additional snow making coverage of 4 acres.

The additional operating cost of the new chair lift per ticket (on the basis of each visitor on average buying 5 day tickets) in the context of raising prices to cover in, This scenario increases support for ticket price by $8.46

1. The model says closing one run makes no difference. Closing 2 and 3 successively reduces support for ticket price and so revenue. If Big Mountain closes down 3 runs, it seems they may as well close down 4 or 5 as there's no further loss in ticket price. Increasing the closures down to 6 or more leads to a large drop.

**Findings from Modelling:**

1. Big Mountain is doing well for vertical drop, but there are still quite a few resorts with a greater drop. Big Mountain is very high up the league table of snow making area.
2. Big Mountain has amongst the highest number of total chairs, resorts with more appear to be outliers.
3. Most resorts have no fast quads, Big Mountain has 3, which puts it high up that league table. There are some values much higher, but they are rare.
4. Big Mountain compares well for the number of runs, There are some resorts with more, but not many.
5. Big Mountain has one of the longest runs, Although it is just over half the length of the longest, the longer ones are rare.
6. The vast majority of resorts, such as Big Mountain, have no trams.
7. Big Mountain is amongst the resorts with the largest amount of skiable terrain.

**Conclusion from Modelling for Pricing Strategy:**

By adding a run, increasing the vertical drop by 150 feet, and installing an additional chair lift. This scenario increases support for ticket price by $8.46. Over the season, this could be expected to amount to $14811594 and also if we are going to add 2 acres of snow making, This scenario increases support for ticket price by $9.75 Over the season, this could be expected to amount to $17068841.