

Random Motors Project Submission

Name -

Q-1a) Formulate the null hypotheses to check whether the new models are performing as per the desired design specifications.

For Rocinante36:

Mileage H_0 : The car's mileage is equal to the specification.

Top speed H_0 : The car's top speed is equal to the specification.

For Marengo32:

Mileage H_0 : The car's mileage is equal to the specification.

Top speed H_0 : The car's top speed is equal to the specification.

Q-1b) Formulate the alternate hypotheses to check whether the new models are performing as per the desired design specifications.

For Rocinante36:

Mileage H_1 : The car's mileage is not equal to the specification.

Top speed H_1 : The car's top speed is not equal to the specification.

For Marengo32:

Mileage H_1 : The car's mileage is not equal to the specification.

Top speed H_1 : The car's top speed is not equal to the specification.

Q-2) In order to comment on whether the design specifications are being matched or not, perform relevant hypothesis tests and calculate the p-value for each. What will you conclude? Assume you are performing the tests at 95% confidence level.

For Rocinante36:

p-value for mileage = 0.0822

p-value for top speed = 0.4315

For Marengo32:

p-value for mileage = 1.0142

p-value for top speed = 0.3729

Conclusion

For all hypothesis p-value is greater than significance value i.e. 0.05.

So, both the variant are not matches the specification of engineers.

Q-3) You have learnt about the possible errors that might result from the hypothesis tests. What type of error is more expensive for Random motors based on the hypothesis they are testing? Why? Assume that you need to refund all your customers if your cars deviate from specifications.

The type of error which is more expensive:

Reason:

Q-4) Develop a regression equation for each model at 95 percent confidence level. From the regression equation predict the sales of the two models.

Develop the regression equation for the Rocinante models and Predict the number of unit sales of Rocinante36 model?

Regression coefficients

Price:- -0.7950

Mileage: 8.3063

Top speed: -0.0186

Equation: Sales= 50.7231+ (-0.7950·Price) + (8.3063·Mileage)+ (-0.0186·Top speed)

=50.7231 + (- 0.7950*7) + (8.3063*22) +(- 0.0186*140)

Predicted Sales(in units): 72.8604 ~ 73

Develop the regression equation for the Marengo models and Predict the number of unit sales of Marengo32 model?

Regression coefficients

Price: -0.1867

Mileage: 0.0413

Top speed: 0.2208

Equation: Sales= -13.4476 + (-0.1867·Price) + (0.0413·Mileage) + (0.2208·Top speed)

= -13.4476+ (-0.1867*41)+ (0.0413*15) + (0.2208*210)

Predicted Sales(in units): 25.8852 ~ 26

Q-5) Based on sales prediction, what is the overall predicted profit for Rocinante36 model and Marengo32 model ?

Overall predicted profit

Rocinante36 Model: 73 lacks

Marengo32 Model: 208 lacks

Q-6) As a CEO, you wish to invest only in the model which is predicted to be more profitable. Which model among Rocinante36 and Marengo32 will you invest in?

Which model you will invest in?

- I will invest in Marengo32

Q-7) Now you must have derived the regression equation for both models, Rocinante and Marengo. Now if you increase the price of Rocinante36 and Marengo32 by 1 lac rupees each, which car will have a higher impact on the sales due to increase in price? Give proper logic for your answer. You can consider that all other specifications such as mileage and top speed remain the same for both models.

Which car is most affected by a price increase? Why?

- Rocinante36 will get impacted more by increase in price by one lack because coefficient of price in Rocinante36(-0.7950) is more negative than the Marengo32(-0.1867).

Q-8) After developing the regression equation for both models (Rocinante and Marengo), if you analyse the p values for coefficients in the regression results, you will notice that some of the regression variables (top speed, mileage and price) are insignificant. Remove the insignificant regression variables from your selection and rebuild the regression model using only significant variables. Compare the Adjusted R square value for the new and old regression model. Do you notice any change in Adjusted R square value? If yes, explain the reason for the change.

Is there a change on Adjusted R square Value? If so, Why?

For Rocinante36, there is no change in adjusted R² because the difference between R² and adjusted R² is small when all predictors are present in the model

For Marengo32, there is change in the adjusted R².