CAPSTONE II BUSINESS RESEARCH PROJECT

Presented by

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PROJECT GOAL

- What is Fuel Economy? *Fuel economy is an **imprecise measure of energy efficiency***
  - ***Is fuel economy affected** by either of the following:*

1. CITY MPG
2. HIGHWAY MPG
3. TOTAL MPG
4. TYPE OF DRIVE
5. FUELTYPE

HYPOTHESES (PART 1)

Hypothesis 1

Null Hypothesis: There is no difference for the mean of City MPG between All-Wheel Drive and 4-Wheel Drive

Alternate Hypothesis: There is a difference for the mean of City MPG between All-Wheel Drive and 4-Wheel Drive

Hypothesis 2

Null Hypothesis: There is no difference for the mean of Highway MPG between All-Wheel Drive and 4-Wheel Drive

Alternate Hypothesis: There is a difference for the mean of Highway MPG between All-Wheel Drive and 4-Wheel Drive

HYPOTHESES (PART 2)

Hypothesis 3

Null Hypothesis: There is no difference for the mean of Total MPG between All-Wheel Drive and 4-Wheel Drive

Alternate Hypothesis: There is a difference for the mean of Total MPG between All-Wheel Drive and 4-Wheel Drive

Hypothesis 4

Null Hypothesis: There is no difference for the mean of Total MPG between Regular and Premium Gasoline

Alternate Hypothesis: There is a difference for the mean of Total MPG between Regular and Premium Gasoline

PROCESS

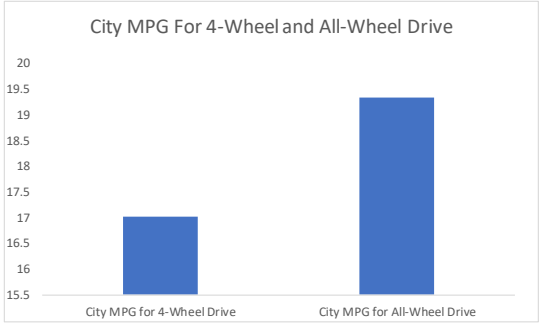
- **Process for Hypothesis 1:** I compared the average mean City MPG of 4-Wheel Drive and All-Wheel Drive and plotted a graph with the results
- **Process for Hypothesis 2:** I compared the average mean Highway MPG of 4-Wheel Drive and All-Wheel Drive, and plotted a graph with the results
- **Process for Hypothesis 3:** I compared the average mean Total City MPG of 4-Wheel Drive and All-Wheel Drive, and plotted a graph with the results
- **Process for Hypothesis 4:** I compared the average mean Total MPG of Regular and Premium Gasoline, and plotted a graph with the results

HYPOTHESIS 1: ANALYSIS OF CITY MPG OF 4-WHEEL DRIVE AND ALL-WHEEL DRIVE

t-Test: Two-Sample Assuming Unequal Variances

	City MPG for 4-Wheel Drive	*MPG for All-Wheel Drive*
Mean	17.02266546	19.33427628
Variance	15.29621902	84.76226326
Observations	1103	2121
Hypothesized Mean Difference	0	
df	3123	
t Stat	-9.963175139	
P(T<=t) one-tail	2.42879E-23	
t Critical one-tail	1.645341691	
P(T<=t) two-tail	4.85758E-23	
t Critical two-tail	1.960723887	

total sample size	3224
mean difference	2.311610827
standard error of difference	0.232015476
Cofidence Interval	0.454918287
c.i. lower	1.85669254
c.i. upper	2.766529114



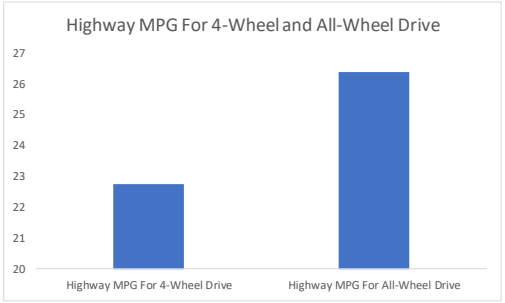
- **Conclusion:** Based on the p value above highlighted in yellow, we rejected null hypothesis because p value is less than alpha. Therefore, there is a statistically significant difference for the mean of city mpg in two groups. All-wheel Drive appears to have a better fuel milage compared to 4-wheel drive

HYPOTHESIS 2: ANALYSIS OF HIGHWAY MPG OF 4-WHEEL DRIVE AND ALL-WHEEL DRIVE

t-Test: Two-Sample Assuming Unequal Variances

	Highway MPG For 4-Wheel Drive	*Highway MPG For All-Wheel Drive*
Mean	22.73617407	26.39651108
Variance	19.45937083	85.42147839
Observations	1103	2121
Hypothesized Mean Difference	0	
df	3202	
t Stat	-15.20969088	
P(T<=t) one-tail	8.51233E-51	
t Critical one-tail	1.645329646	
P(T<=t) two-tail	1.70247E-50	
t Critical two-tail	1.960705132	

total sample size	3224
mean difference	3.660337009
standard error of difference	0.240658212
Cofidence Interval	0.471859791
c.i. lower	3.188477218
c.i. upper	4.1321968



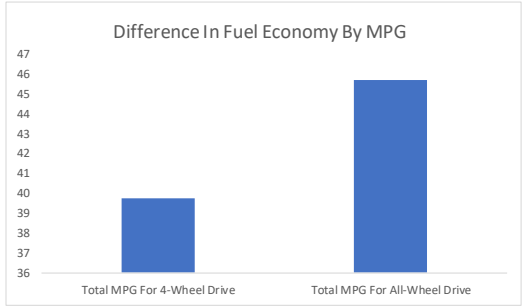
Conclusion: Based on the p value above highlighted in blue, we rejected null hypothesis because p value is less than alpha. Therefore, there is a statistically significant difference for the mean of Highway mpg in two groups. All-wheel Drive appears to have a better fuel milage compared to 4-wheel drive.

HYPOTHESIS 3: ANALYSIS OF TOTAL MPG OF 4-WHEEL DRIVE AND ALL-WHEEL DRIVE

t-Test: Two-Sample Assuming Unequal Variances

	Total MPG For 4-Wheel Drive	*Total MPG For All-Wheel Drive*
Mean	39.75883953	45.73078736
Variance	66.71855836	336.456264
Observations	1103	2121
Hypothesized Mean Differer	0	
df	3161	
t Stat	-12.75779922	
P(T<=t) one-tail	1.09653E-36	
t Critical one-tail	1.645335822	
P(T<=t) two-tail	2.19306E-36	
t Critical two-tail	1.960714748	

total sample size	3224
mean difference	5.971947836
standard error of difference	0.468101726
Confidence interval	0.917813958
c.i. lower	5.054133878
c.i. upper	6.889761794

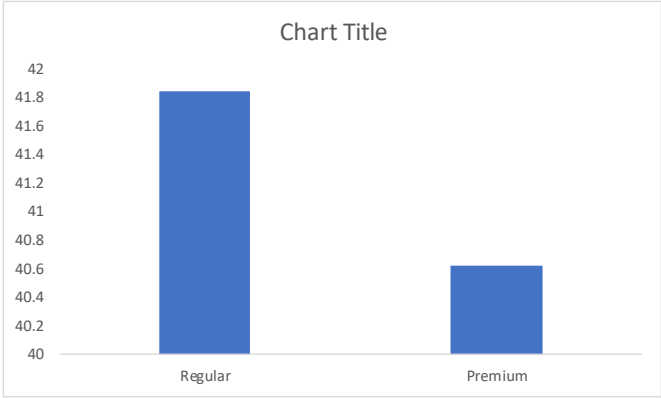


Conclusion: Based on the p value above highlighted in red, we rejected null hypothesis because p-value is less than alpha. Hence, there is a statistically significant difference for the mean of Total mpg(combination of City and Highway MPG) in two groups. All-wheel Drive appears to have a better fuel.

t-Test: Two-Sample Assuming Unequal Variances

	Regular	*Premium*
Mean	41.8470584	40.62321
Variance	116.430462	68.09607
Observations	25258	10133
Hypothesized Mean Difference	0	
df	24226	
t Stat	11.4977957	
P(T<=t) one-tail	8.1203E-31	
t Critical one-tail	1.64491653	
P(T<=t) two-tail	1.62E-30	
t Critical two-tail	1.96006191	

total sample size	35391
mean difference	1.22384707
standard error of difference	0.10644189
Confidence interval	0.20863269
c.i. lower	1.01521438
c.i. upper	1.33028895
s pooled	9.60537704
cohen's d	0.1274127



HYPOTHESIS 4: ANALYSIS OF TOTAL MPG OF 4-WHEEL DRIVE AND ALL-WHEEL DRIVE

Conclusion: Based on the p value above highlighted in gray, we rejected null hypothesis because p value is less than alpha. Therefore, there is a statistically significant difference for the mean of Fuel type in two groups. Regular Gas appears to have a better fuel milage compared.

DISCUSSION AND RECOMMENDATIONS

- Discussion: As we can see from the data All-Wheel Drive has a higher Fuel economy than 4-Wheel Drive vehicles at least by a average of 3 miles. This should prove to help entrepreneurs and potential car owners to know the type of Car Drive and fuel type that will help them in profits and savings, respectively.
- Recommendations: I recommend consumers of cars to buy All-Wheel Drive cars and make sure the fuel it uses is regular gasoline