In this Case study I'll be assessing information given by regression to determine any conclusions that can be made about the data on soft drink consumption demand across the 48 contiguous US and how it relates to the price per six-pack, income per capita, and the mean temperature in F. Using the data provided for the prompt I used a multiple regression program in Excel to produce this summary output *(Figure 1).* Using this data, we can take the coefficients of each dependent variable to come up with this estimated demand equation: Q=514.267-242.97P+1.224I+2.93T. What this formula shows is that for every $1 increase in price quantity demanded of soft drinks will decrease by 242.97 cans per capita per year. For every $1 increase in Income per capita increase will increase the quantity demanded of soft drinks by 1.224 cans per capita per year. And for every 1 degree in F increase quantity demanded of soft drinks will increase by 2.931 cans per capita per year. Using adjusted r square for a multiple regression you can see that the coefficient of determination is .677 meaning that 67.7% of the change in soft drink quantity demanded is explained by the variation in 6pack price, income per capita, and mean temperatures. 23.3% is unexplained. The correlation coefficient is also quite high at 0.835 indicating that there is a strong relationship between soft drink demand, price per 6-pack, income per capita, and mean temperature. Furthermore, based on the dependent variable's P-Value, there is a significant positive relationship between the mean temperature and the number of cans per capita per year consumed with β3T having a P-Value below 0.05 at 0.00004. In addition, there is a statistically significant negative relationship between the price of 6 packs of soft drinks and the number of cans consumed per capita per year with β1P having a P-value of 1.382E-06. Based on the P Value of β2I being above 0.05 at 0.426, there is no significant statistical correlation between Income and the number of cans per capita per year consumed. Finally, taking the average from the sample of cans per capita per year and the price per six-pack we can see that the elasticity of demand of soft drinks is -3.38 indicating that demand is elastic.

Next, I will exclude price from the estimated demand equation. Running the data through the same Excel program shows this summary output *(Figure 2).* Here the estimated demand equation is Q=56.614-2.054I+4.695T which means for every $1 increase in Income per capita increase will decrease the quantity demanded of soft drinks by 2.054 cans per capita per year. And for every 1 degree in F increase quantity demanded of soft drinks will increase by 4.695 cans per capita per year. Looking at the P-values for income and mean temperature we can see that income is still not statistically significant with a value far above 0.05 at 0.264. Additionally, mean temperature still is significant with a P-value near zero. But when looking at the coefficient of determination, adjusted r square, we can see that the value is quite low at 0.461 meaning that only 46.1% of the change in soft drink quantity demanded is explained by the variation in income per capita and mean temperatures. 53.9% is still unexplained. The correlation coefficient is a bit low at 0.696 indicating that there is not much strength in the relationship between soft drink demand, income per capita and mean temperature. This would make sense given that income is not a significant factor of soft drink consumption based on the data.

Lastly, if we were to take mean temperature away from the estimated demand function leaving just Income per Capita we get this summary output *(Figure 3)*. Here we see again that not much has changed in income per capita's significance towards soft drinks demanded. The estimated demand equation is 254.563-5.372I meaning that for every $1 increase in Income per capita will decrease the quantity demanded of soft drinks by 5.372 cans per capita per year. Looking at the coefficient of determination again we can see that now its very low at only 0.112 meaning that only 11.2% of the change in soft drink quantity demanded is explained by the variation in income per capita the change in soft drink quantity demanded is explained by the variation in income per capita. With a staggering 90.8% being unexplained. The correlation coefficient is also quite low at only 0.334 indicating that there is not much strength in the relationship between soft drink demand and income. But strangely enough the P-Value of income per capita is under the 0.05 threshold at 0.020 indicating that there is a significant negative relationship between income per capita and soft drink demand. This would indicate that soft drinks are a inferior good, but the correlation coefficient being weak would mean that this significance is unlikely. When price and mean temperature are factored in, income becomes a statistically insignificant factor to soft drink demand in the 48 contiguous US.

In conclusion based on the evidence from these regression equations the best fit for predicting the future of soft drink demand would be the first equation: Q=514.267-242.97P+1.224I+2.93T. This equation has the highest likelihood of predicting the demand since it has a high coefficient of determination near 1 while also having variables that have a strong relationship with demand based on their P-Values. To answer the question of whether a marketing plan should relocate canned drink machines into low-income area, I believe based on this data that they should not. From this data income has been shown to not have a significant influence on soft drink demand and therefore is not worth the cost of relocating the machines. A better plan would be to try and get the demand close to unit elasticity to increase TR.

Appendix

(Figure 1)

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.835478
R Square	0.698024
Adjusted R Square	0.677435
Standard Error	38.26108
Observations	48

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	148889.9	49629.95	33.90231	1.65E-11
Residual	44	64412.06	1463.91		
Total	47	213301.9			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	514.2669	113.3315	4.537722	4.36E-05	285.8623	742.6716	285.8623	742.6716
6-Pack $ Price	-242.971	43.52628	-5.58216	1.38E-06	-330.692	-155.249	-330.692	-155.249
Income $/Capita	1.224164	1.522613	0.803989	0.425726	-1.84446	4.292788	-1.84446	4.292788
Mean Temp F	2.931228	0.711458	4.120027	0.000165	1.497378	4.365078	1.497378	

(Figure 2)

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.695821
R Square	0.484166
Adjusted R Square	0.46124
Standard Error	49.44768

Observations	48

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	103273.6	51636.81	21.11872	3.4E-07
Residual	45	110028.3	2445.073		
Total	47	213301.9			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	56.614	63.11655	-0.89698	0.374502	-183.738	70.50884	-183.738	70.50884
Income $/Capita	-2.05439	1.815498	-1.13158	0.263804	-5.71099	1.602212	-5.71099	1.602212
Mean Temp F	4.695034	0.823817	5.699123	8.71E-07	3.035781	6.354286	3.035781	6.354286

(Figure 3)

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.334439
R Square	0.111849
Adjusted R Square	0.092542
Standard Error	64.1744
Observations	48

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	23857.66	23857.66	5.79301	0.020162
Residual	46	189444.3	4118.353		
Total	47	213301.9			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*

Intercept	254.5629	41.09082	6.195129	1.48E-07	171.8514	337.2744	171.8514	337.2744
Income $/Capita	-5.37168	2.231815	-2.40687	0.020162	-9.8641	-0.87927	-9.8641	-0.87927