STORE LEVEL

SCANNER DATA

Analyzed peanut butter store-level scanner dataset to identify various metrics affecting brand sales & market share through SAS.

Course
Predictive Analytics using SAS

1. **What are the top 6 brands in the category in terms of dollar sales? What are the market shares of the 6 brands.**

   From the results, we can see that JIF is a top brand with $15.4 million in sales and a market share of 33.16%. Private labels are manufactured by one company for some other company and sold under a different name and it contributes to 23.6% of market share. Skippy and Skippy Super Chunk gathered about $13.4 million in sales with a market share of 28.83%. Peter Pan contributed to $5.4 million in sales with a market share of 11.6%. Smuckers makes $1.2 million in sales and accounts for 2.75 % in market share.

The SAS System

Obs	Brand	Dollar_Sales
1	JIF	15485633.63
2	PRIVATE LABEL	11036837.98
3	SKIPPY	9723560.32
4	PETER PAN	5418019.59
5	SKIPPY SUPER CHUNK	3740171.08
6	SMUCKERS	1287036.08

The SAS System

Brand	Dollar_Sales	MARKET_SHARE
JIF	15485634	33.16602
PRIVATE LABEL	11036838	23.63791
SKIPPY	9723560	20.82523
PETER PAN	5418020	11.60393
SKIPPY SUPER CHUNK	3740171	8.010431
SMUCKERS	1287036	2.756482

2. Which companies are the major players in the category? Which company owns which brands?

JM Smucker Co is a major player which owns two of the top 6 brands including the top brand JIF. Private Label, Unilever Best foods, Conagra foods, the Hershey company and the Leavitt corp are the other major players in the market.

Company	Brand	Sum
J M SMUCKER CO	JIF	15485633.63
	SMUCKERS	1287036.08
	JIF SMOOTH SENSATIONS	282866.22
	SIMPLY JIF	820081.16
	LAURA SCUDDER	721199.74
	ADAMS	629895.74
	ADAMS NO STIR	132041.23
PRIVATE LABEL	PRIVATE LABEL	11036837.98
UNILEVER BESTF	SKIPPY	9723560.32
	SKIPPY SUPER CHUNK	3740171.08
	SKIPPY DOUBLY DELICIOUS	176168.50
CONAGRA FOODS	PETER PAN	5418019.59
	PETER PAN SMART CHOICE	1096372.55
	PETER PAN PLUS	643635.86
THE HERSHEY CO	REESES	757606.51
LEAVITT CORP	LEAVITT TEDDIE	396325.14

3. Create a 7th brand called "Other" that has all other brands that are not in the top 6.

The SAS System

The FREQ Procedure

Brand	Frequency	Percent	Cumulative Frequency	Cumulative Percent
OTHER	523591	22.95	523591	22.95
JIF	504893	22.13	1028484	45.08
PRIVATE LABEL	497662	21.81	1526146	66.90
SKIPPY	265796	11.65	1791942	78.55
PETER PAN	235745	10.33	2027687	88.88
SKIPPY SUPER CHUNK	176173	7.72	2203860	96.60
SMUCKERS	77474	3.40	2281334	100.00

4. Find average prices, display, features of each of the 7 brands.

For the top brand (JIF), the average price is the highest when there are no features (like ads or coupons) irrespective of when the product is on display/not.

				Analysis Variable : PRICE_PER_UNIT				
Brand	Display	Feature	N Obs	N	Mean	Std Dev	Minimum	Maximum
JIF	0	A	6480	6480	2.0247048	0.8197959	0.6000000	7.9900000
		A+	727	727	2.5711761	0.8738610	1.6900000	6.9900000
		B	11604	11604	2.0965034	0.7314684	0.8800000	7.9900000
		C	1890	1890	2.2378659	0.8680056	1.5000000	7.4900000
		NONE	476097	476097	3.4482780	1.5553983	0.2900000	12.9800000
	1	A	507	507	2.1779868	1.0361011	0.9900000	7.9900000
		A+	15	15	2.9426667	0.9148416	1.7100000	4.3900000
		B	502	502	1.9467300	0.9369042	0.8800000	7.9900000
		C	61	61	1.8309872	0.1892696	1.5000000	2.6900000
		NONE	2564	2564	3.0114338	1.9962243	0.9900000	9.9900000
	2	A	864	864	2.0960917	1.1348811	0.8800000	7.9900000
		A+	32	32	2.8484375	1.1050416	1.7000000	6.9900000
		B	906	906	1.9682765	0.9137945	0.8800000	7.9900000
		C	56	56	1.9383929	0.3376915	1.5000000	3.4900000
		NONE	2588	2588	2.8742613	1.4694295	1.0200000	10.1000000

OTHER	0	A	5692	5692	1.7123908	0.4468024	0.4900000	4.3900000
		A+	1207	1207	2.4582636	0.5246269	1.5900000	3.1900000
		B	7238	7238	1.8917424	0.3778761	0.6000000	4.9900000
		C	1643	1643	2.1104420	0.7310560	1.4900000	5.6900000
		NONE	505201	505201	2.6528943	0.8914861	0.1000000	13.7700000
	1	A	125	125	1.5749011	0.2560571	0.9800000	2.1500000
		A+	17	17	2.9823529	0.4174406	1.7900000	3.1800000
		B	166	166	1.6356479	0.2047927	0.9900000	2.5000000
		C	18	18	1.9283492	0.9412821	1.5000000	4.4900000
		NONE	947	947	2.4077797	0.7918548	0.2000000	7.0500000
	2	A	345	345	1.7051313	0.7709402	0.8950450	4.3900000
		A+	14	14	2.4850000	0.7575949	1.5900000	3.1800000
		B	175	175	1.9063835	0.3612592	0.9900000	2.7900000
		C	24	24	2.1079167	1.1135879	1.4900000	4.4900000
		NONE	779	779	2.3988262	0.9338570	0.4946667	8.9900000
PETER PAN	0	A	4018	4018	1.6665202	0.5817121	0.4900000	6.0500000
		A+	374	374	3.6303743	1.6422656	0.9900000	6.9900000
		B	4595	4595	1.7882653	0.4583679	0.8900000	4.9898148
		C	1022	1022	1.7900278	0.4620578	1.4947826	5.2800000
		NONE	221068	221068	2.9072771	1.2312693	0.9800000	7.9600000
	1	A	356	356	1.5330968	0.4973283	0.8600000	3.7900000
		A+	16	16	1.6575000	0.3644448	0.9900000	2.0100000
		B	315	315	1.7014107	0.5220218	0.9900000	4.9898667
		C	32	32	1.6437769	0.3731061	1.4950000	3.4900000
		NONE	1419	1419	2.1332585	0.5115481	1.0589655	6.4900000
	2	A	673	673	1.3815748	0.3139488	0.8700000	2.9900000
		A+	3	3	1.5233333	0.4618802	0.9900000	1.7900000
		B	386	386	1.6615117	0.4983282	0.9900000	4.9898958
		C	58	58	1.5500981	0.1079311	1.4947826	1.7900000
		NONE	1410	1410	2.0920546	0.6372213	1.2900000	6.4900000

For Private Labels, highest average price is achieved only when retailer coupon code is given (i.e. when feature is A+)

PRIVATE LABEL	0	A	7657	7657	1.8526092	0.8992612	0.7456667	9.0400000
		A+	737	737	3.0904531	1.3807778	0.9900000	6.7900000
		B	9903	9903	2.0438085	0.8884198	0.4900000	6.9900000
		C	1522	1522	2.0497754	0.9083738	1.2700000	4.9800000
		NONE	461103	461103	2.9680516	1.3944090	0.4900000	12.9900000
	1	A	550	550	1.4121471	0.4219687	0.7924609	3.6475758
		A+	33	33	2.2131026	1.2253403	0.9899371	3.9900000
		B	531	531	1.4471346	0.5722678	0.9000000	4.9900000
		C	162	162	1.4574048	0.1920630	1.2700000	3.6900000
		NONE	5787	5787	2.0035418	0.8178355	0.9000000	9.2900000
	2	A	981	981	1.3852828	0.4117722	0.7455556	4.9895238
		A+	75	75	2.5278739	1.0620541	0.9899611	3.9900000
		B	1048	1048	1.5992263	0.7351745	0.9000000	5.9900000
		C	375	375	1.4165606	0.2236213	1.2700000	4.8900000
		NONE	7198	7198	2.1104888	0.9478915	0.5000000	8.4900000

SKIPPY	0	A	6281	6281	1.8073697	0.7403270	0.8900000	6.6850000
		A+	2448	2448	2.2604648	0.7217045	0.9900000	6.8800000
		B	11301	11301	1.9156794	0.8499886	0.7000000	6.9900000
		C	981	981	2.8531534	1.7721271	0.9900000	7.3800000
		NONE	240091	240091	3.4349217	1.6969696	0.7000000	10.3100000
	1	A	272	272	1.5987882	0.7232967	0.9799583	6.6866667
		A+	60	60	2.0380865	0.6354985	0.9900000	3.4500000
		B	371	371	1.7119757	0.4994780	0.7000000	5.9897727
		C	21	21	1.6680952	0.3818720	0.9900000	3.0300000
		NONE	1071	1071	2.5459778	1.2315885	1.3400000	7.1566667
	2	A	696	696	1.3880943	0.4437233	0.8900000	6.6880000
		A+	104	104	2.0826953	0.5264238	1.3949020	3.5600000
		B	938	938	1.5961728	0.4991245	0.7000000	5.9900000
		C	32	32	1.5984375	0.5621624	0.9900000	3.0300000
		NONE	1129	1129	2.3679836	0.8298492	1.0000000	7.9900000

Skippy Super chunk has generated highest average price when they are advertised with a small ad (single line of text)

SKIPPY SUPER CHUNK	0	A	2388	2388	2.0875587	0.9536084	0.9712500	5.9900000
		A+	1245	1245	2.6837290	0.7173972	0.9900000	5.8800000
		B	3178	3178	2.0821001	1.0471565	0.6900000	6.8900000
		C	264	264	4.7714394	1.8914137	1.9900000	6.9900000
		NONE	165643	165643	3.2029966	1.4370823	0.7000000	9.1900000
	1	A	82	82	1.4854544	0.3438620	0.9900000	2.9900000
		A+	30	30	2.3808261	0.6694265	0.9900000	3.4500000
		B	57	57	2.0011087	0.8924983	0.7000000	5.9895652
		C	1	1	3.0300000	.	3.0300000	3.0300000
		NONE	1077	1077	2.2623340	0.7001408	0.9900000	6.9900000
	2	A	161	161	1.7609267	0.5070696	0.9900000	3.2900000
		A+	42	42	2.5373593	0.5407978	1.7900000	3.5600000
		B	199	199	1.6840940	0.8918204	0.7000000	5.9900000
		C	3	3	3.0300000	0	3.0300000	3.0300000
		NONE	1803	1803	2.2172367	0.6581659	0.9800000	6.9900000

Smuckers generates similar highest average price no matter what the display and features are.

SMUCKERS	0	A	69	69	2.0527536	0.0990229	2.0000000	2.2900000
		A+	22	22	2.1718182	0.3633657	1.9900000	2.9900000
		B	237	237	2.5906329	0.1916587	2.2900000	2.9900000
		C	95	95	2.3758111	0.1648754	1.9900000	2.4894118
		NONE	76917	76917	2.6559397	0.2487404	0.4900000	3.7500000
	1	A	2	2	2.0000000	0	2.0000000	2.0000000
		A+	5	5	1.9900000	0	1.9900000	1.9900000
		NONE	76	76	2.3792105	0.1898895	2.0000000	2.6900000
	2	A	5	5	2.0000000	0	2.0000000	2.0000000
		A+	5	5	1.9900000	0	1.9900000	1.9900000
		C	3	3	1.9900000	0	1.9900000	1.9900000
		NONE	38	38	2.2936842	0.0978532	2.1900000	2.4900000

5. **What are the top 5 regions in terms of dollar sales?**

   Among the top 5 regions, $26 million in dollar sales came from the Carolina states.

   The SAS System

Obs	Market_Name	DOLLARS_Sum
1	RALEIGH/DURHAM	925253.27
2	ROANOKE	891174.62
3	HOUSTON	829268.82
4	SOUTH CAROLINA	783921.94
5	BIRMINGHAM/MONTG.	775494.41

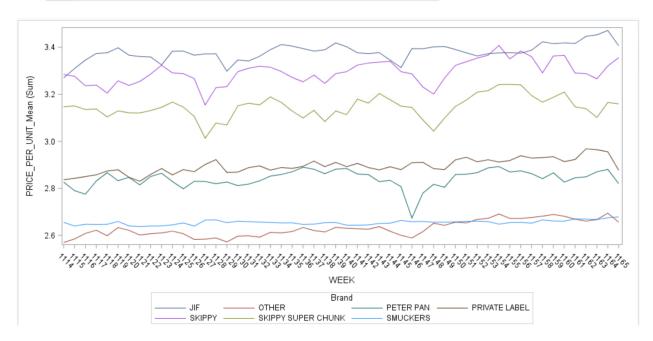6. **What are the top 10 store chains that sell a lot of your category in terms of dollar sales?**

   The SAS System

Obs	MskdName	DOLLARS_Sum
1	Chain55	929989.74
2	Chain122	849085.89
3	Chain30	813753.22
4	Chain44	799077.16
5	Chain85	704959.87
6	Chain119	701673.82
7	Chain98	683084.86
8	Chain137	651783.39
9	Chain5	650409.66
10	Chain69	640944.98

7. **What is the average price per unit of 7 brands by week? Plot the average price by week (I wish to see a line plot of price by week). Comment on your findings.**

The SAS System

WEEK	PRICE_PER_UNIT						
	Brand						
	JIF	OTHER	PETER PAN	PRIVATE LABEL	SKIPPY	SKIPPY SUPER CHUNK	SMUCKERS
	Mean	Mean	Mean	Mean	Mean	Mean	Mean
1114	3.27	2.57	2.83	2.84	3.28	3.15	2.66
1115	3.31	2.58	2.79	2.84	3.28	3.15	2.64
1116	3.35	2.61	2.77	2.85	3.24	3.14	2.65
1117	3.37	2.62	2.83	2.86	3.24	3.14	2.65
1118	3.38	2.60	2.87	2.87	3.21	3.10	2.65
1119	3.40	2.63	2.83	2.88	3.26	3.13	2.66
1120	3.37	2.62	2.85	2.85	3.24	3.12	2.64
1121	3.36	2.60	2.81	2.83	3.25	3.12	2.64
1122	3.36	2.61	2.85	2.86	3.29	3.13	2.64
1123	3.33	2.61	2.86	2.88	3.32	3.14	2.64
1124	3.38	2.62	2.83	2.86	3.29	3.17	2.64
1125	3.38	2.61	2.80	2.88	3.29	3.15	2.65
1126	3.37	2.58	2.83	2.87	3.27	3.11	2.64
1127	3.37	2.58	2.83	2.90	3.15	3.01	2.66
1128	3.37	2.59	2.82	2.92	3.23	3.08	2.67
1129	3.30	2.57	2.83	2.87	3.23	3.07	2.65
1130	3.35	2.60	2.81	2.87	3.30	3.15	2.66
1131	3.34	2.60	2.82	2.89	3.31	3.16	2.66
1132	3.36	2.59	2.83	2.90	3.32	3.15	2.66
1133	3.39	2.61	2.85	2.88	3.32	3.19	2.65
1134	3.41	2.61	2.86	2.89	3.30	3.17	2.65
1135	3.41	2.62	2.87	2.88	3.27	3.13	2.65
1136	3.39	2.63	2.89	2.89	3.25	3.10	2.65
1137	3.38	2.62	2.88	2.92	3.28	3.13	2.65
1138	3.39	2.61	2.86	2.89	3.25	3.08	2.65
1139	3.42	2.63	2.88	2.91	3.29	3.13	2.65
1140	3.40	2.63	2.88	2.89	3.30	3.11	2.64
1141	3.38	2.63	2.86	2.91	3.32	3.18	2.64
1142	3.37	2.63	2.86	2.89	3.33	3.16	2.64

1143	3.38	2.64	2.83	2.88	3.34		3.20	2.65
1144	3.35	2.62	2.83	2.89	3.34		3.18	2.65
1145	3.31	2.60	2.81	2.88	3.30		3.15	2.66
1146	3.39	2.59	2.67	2.91	3.29		3.14	2.66
1147	3.39	2.62	2.78	2.91	3.23		3.09	2.66
1148	3.40	2.65	2.82	2.88	3.20		3.04	2.66
1149	3.40	2.64	2.80	2.88	3.27		3.10	2.66
1150	3.39	2.66	2.86	2.92	3.32		3.15	2.66
1151	3.38	2.65	2.86	2.93	3.34		3.18	2.66
1152	3.36	2.67	2.87	2.91	3.35		3.21	2.66
1153	3.37	2.67	2.89	2.92	3.37		3.22	2.66
1154	3.38	2.69	2.89	2.91	3.41		3.24	2.65
1155	3.38	2.67	2.87	2.92	3.35		3.24	2.65
1156	3.37	2.67	2.87	2.94	3.38		3.24	2.65
1157	3.39	2.68	2.86	2.93	3.36		3.19	2.65
1158	3.42	2.68	2.84	2.93	3.29		3.17	2.67
1159	3.42	2.69	2.87	2.93	3.36		3.19	2.66
1160	3.42	2.68	2.83	2.91	3.37		3.21	2.66
1161	3.42	2.67	2.84	2.92	3.29		3.15	2.67
1162	3.45	2.66	2.85	2.97	3.29		3.14	2.67
1163	3.45	2.67	2.87	2.96	3.27		3.10	2.67
1164	3.47	2.69	2.88	2.96	3.32		3.17	2.67
1165	3.41	2.66	2.82	2.88	3.36		3.16	2.68

JIF, Skippy & Skippy super chunk is a premium brand as its average unit price has sustained above 3$. Private label and Peter pan belong to mediocre category. Others and Smuckers belong to the economical segment.

Average unit price of Smuckers has remained the same throughout the weeks. There was not much difference in average prices.

Average unit prices of Skippy and Skippy super chunk dropped on the weeks of 1127 and 1148. This means that the company Unilever has dropped the prices of both of its brands on those weeks. Since these are premium brands.

8. **Assume you are manager of a specific brand (out of the top 6). Write a short paragraph stating what you learned from this descriptive analysis (steps 1-7).**

We are the manager of the brand "Skippy". Skippy has generated $9.7 million in sales which attributes to 20.8% of the market share. Skippy is owned by Unilever best foods which is one among the major players in terms of dollar sales. The average unit price varies between 1.38 to 3.43 based on the display and features.

As you can see the competitor for Skippy should be JIF and both belong to the group of Premium brands. JIF has generated 15.4 million in sales which attributes to 33.16% of the market share. Average unit price varies between 1.9 to 3.4. Though the highest average price is similar for both the brands, the lowest average price is comparatively low for Skippy because of sudden dips in the average unit price observed in the weeks of 1127 and 1148. The number of units sold for Skippy is around 265 K whereas the number of units sold for JIF is around 504K. So, we can double the market share and dollar sales of Skippy and stay competitive with JIF if we increase the number of units of Skippy sold.

9. **Do large stores (top 3 stores) have higher average price per unit than small stores (stores ranked 8-10) for brand 1 (the top brand in Q1). Test and report your results and comments.**

F-test: H0 => Variances are equal; H1 => Variances are not equal.
P-value <0.0001 which is less than 0.05, so we reject null hypothesis. Hence, we need to run t-test for unequal variance.

T-test for unequal variances: (Satterthwaite)
H0 => Average price per unit in Large stores is equal to the average price per unit in small stores.
H1 => Average price per unit in Large stores is higher than average price per unit in small stores.
P-value < 0.0001 which is less than 0.05, so we reject null hypothesis. Hence, we can conclude that the average price per unit in Large stores is higher than the average price per unit in small stores.

The TTEST Procedure

Variable: PRICE_PER_UNIT

MskdName	N	Mean	Std Dev	Std Err	Minimum	Maximum
LARGE	18641	3.3681	1.7353	0.0127	1.5000	10.1000
SMALL	14496	3.5938	1.5394	0.0128	1.9900	8.9900
Diff (1-2)		-0.2257	1.6524	0.0183		

MskdName	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
LARGE		3.3681	3.3431	3.3930	1.7353	1.7178	1.7530
SMALL		3.5938	3.5687	3.6188	1.5394	1.5219	1.5573
Diff (1-2)	Pooled	-0.2257	-0.2616	-0.1898	1.6524	1.6400	1.6651
Diff (1-2)	Satterthwaite	-0.2257	-0.2610	-0.1904			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	33135	-12.33	<.0001
Satterthwaite	Unequal	32566	-12.52	<.0001

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	18640	14495	1.27	<.0001

10. Develop three additional hypotheses linking useful variables to dollar sales, test them and report your findings.

a) **Do the dollar sales for the top brand (JIF) vary across different regions (market names)?**
H0: Average dollar sales for JIF is the same across different regions
H1: Average dollar sales for JIF is different across different regions.

The SAS System

The ANOVA Procedure

Dependent Variable: DOLLARS

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	49	94408197	1926698	1002.08	<.0001
Error	504843	970658917	1923		
Corrected Total	504892	1065067114			

R-Square	Coeff Var	Root MSE	DOLLARS Mean
0.088641	142.9636	43.84854	30.67112

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Market_Name	49	94408196.97	1926697.90	1002.08	<.0001

 P-value <0.0001 which is less than 0.05, so we reject null hypothesis. This helps us to infer that the average dollar sales for the top brand JIF is different across all the regions.

b) Do the dollar sales for top brand (JIF) vary across different features?
H0: Average dollar sales for JIF is the same across different features.
H1: Average dollar sales for JIF is different across different features.

The SAS System

The ANOVA Procedure

Dependent Variable: DOLLARS

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	46752809	11688202	5795.10	<.0001
Error	504888	1018314305	2017		
Corrected Total	504892	1065067114			

R-Square	Coeff Var	Root MSE	DOLLARS Mean
0.043897	146.4245	44.91004	30.67112

Source	DF	Anova SS	Mean Square	F Value	Pr > F
Feature	4	46752809.36	11688202.34	5795.10	<.0001

P-value <0.0001 which is less than 0.05, we reject null hypothesis. Thus, we can conclude that the average dollar sales for JIF is different across different features. This means that the dollar sales differ when the brand publishes a small ad or a medium sized ad or a large ad or a retailer coupon/rebate.

c) **Are dollar sales of items with price reduction higher than those of items without price reduction?**
   F-test: H0=> Variances are equal; H1=> Variances are not equal
   P- value is <0.001 which is less than 0.05, so we reject null hypothesis. Thus, we should use t-test for unequal variances.
   t-test for unequal variances:
   H0 => Average dollar sales of items with price reduction is same as the average dollar sales of items without price reduction.
   H1 => Average dollar sales of items with price reduction is higher than those of items without price reduction.

Variable: DOLLARS

Price_Reduction	N	Mean	Std Dev	Std Err	Minimum	Maximum
0	2005987	21.0397	30.8949	0.0218	0.1000	14747.7
1	275347	39.8611	83.2035	0.1586	0.1000	8234.5
Diff (1-2)		-18.8213	40.9249	0.0832		

Price_Reduction	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
0		21.0397	20.9970	21.0825	30.8949	30.8647	30.9252
1		39.8611	39.5503	40.1718	83.2035	82.9843	83.4238
Diff (1-2)	Pooled	-18.8213	-18.9843	-18.6583	40.9249	40.8874	40.9625
Diff (1-2)	Satterthwaite	-18.8213	-19.1350	-18.5076			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	2.28E6	-226.29	<.0001
Satterthwaite	Unequal	285853	-117.59	<.0001

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	275346	2.01E6	7.25	<.0001

P-value is <0.001 which is less than 0.05, so we reject null hypothesis. This means that average dollar sales of items with price reduction is higher than that of items without price reduction. Hence, we can conclude that the customers show a preference towards items when their prices are reduced.

11. **For the top brand: run a regression model with weekly dollar sales as dependent variable. Use average weekly price per unit, average display, average feature, and other useful variables in your regression and answer the following questions:**
    a. **What is the R-sq and adj R-sq of the model?**
       R-squared -> 6.97 %, Adj R-squared -> 6.96%
    b. **Which coefficients are significant?**
       Price_Reduction_0, Feature A, Feature A+, Feature B, Feature C, AVG_Price_per_unit are significant.
    c. **Which variables are most important in explaining sales?**
       Average price per unit is the most important variable in explaining sales because the std estimate value for avg.price is the highest (-0.255).
    d. **Interpret the meaning of the price coefficient? What is the price elasticity?**
       Price elasticity value is -2.33. With respect to price coefficient, we can interpret that when there is a 1% increase in price then there is a corresponding 2.33 % decrease in sales.

e. **Interpret the meaning of the display coefficient?**
   Since the display coefficient is not significant, interpreting it will not turn out to be meaningful.

f. **Test whether there is an interaction between display, feature and price. Comment on your findings.**
   Average price per unit of the items are significant when it's not on display (i.e. 0) and for all features except C (i.e. small ad).
   Average price per unit of the items are significant when it's on display (i.e. 1) and for all features that includes A (Large ad), A+(coupon), B (medium size ad).
   Average price per unit of the items are significant when it's on display (i.e. 2) and for all features that includes A (Large ad), A+(coupon), B (medium size ad).

g. **Test whether the effect of price is non-linear. Comment on your findings.**

   The effect of price is non-linear as its coefficient when we run the model with polynomial terms was found to be significant.

h. **Test using VIF and COLLIN whether there is multicollinearity in the model? Comment on your findings.**
   Using the results from VIF there is no proof that there is presence of collinearity. However, the results from COLLIN suggests presence of multicollinearity.