

```

* Dr. Steven S. Vickner;
* MSBA 635 - Data Analytics II;

* print data;

```

```

proc print data=tmp1.case_wine;
run;

```

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Obs	week	qwz	pwz	pch	pcs	pm	time	peak		
1	4 Week Ending Feb 4, 1996	328030.47	4.82092	7.35486	7.4494	7.48548	1	0		
2	4 Week Ending Mar 3, 1996	350937.91	4.79598	7.35452	7.4015	7.55505	2	0		
3	4 Week Ending Mar 31, 1996	372483.09	4.65581	7.35238	7.4042	7.36810	3	0		
4	4 Week Ending Apr 28, 1996	396047.38	4.59832	7.67342	7.8477	7.94540	4	0		
5	4 Week Ending May 26, 1996	297521.63	4.99818	7.83499	7.9350	7.88733	5	0		
6	4 Week Ending Jun 23, 1996	313780.38	4.97526	7.84120	8.1346	7.91366	6	0		
7	4 Week Ending Jul 21, 1996	300815.69	5.05715	7.96897	8.2394	8.05824	7	0		
8	4 Week Ending Aug 18, 1996	301216.88	5.06003	7.87916	8.2217	7.77448	8	0		
9	4 Week Ending Sep 15, 1996	290824.97	5.24157	7.99181	8.2043	8.13074	9	0		
10	4 Week Ending Oct 13, 1996	286408.50	5.25932	7.91214	7.9870	7.93152	10	0		
11	4 Week Ending Nov 10, 1996	310627.34	5.19036	8.01505	8.2129	8.11458	11	0		
12	4 Week Ending Dec 8, 1996	539698.19	4.61598	8.13611	8.3450	8.19679	12	1		
13	4 Week Ending Jan 5, 1997	450740.50	4.90721	8.41282	8.7656	8.71631	13	1		
14	4 Week Ending Feb 2, 1997	273374.53	5.42279	8.25341	8.4667	8.30097	14	0		
15	4 Week Ending Mar 2, 1997	366885.50	5.09973	8.40755	8.6657	8.28217	15	0		
16	4 Week Ending Mar 30, 1997	350086.28	5.09602	8.23675	8.4686	8.12046	16	0		
17	4 Week Ending Apr 27, 1997	304163.50	5.33140	8.36981	8.5524	8.21876	17	0		
18	4 Week Ending May 25, 1997	304209.06	5.32443	8.48896	8.6565	8.24971	18	0		
19	4 Week Ending Jun 22, 1997	299864.75	5.45072	8.81662	8.8286	8.33488	19	0		
20	4 Week Ending Jul 20, 1997	323524.38	5.33101	8.95239	9.1878	8.68166	20	0		
21	4 Week Ending Aug 17, 1997	296021.75	5.40952	8.80202	8.9226	8.65650	21	0		
22	4 Week Ending Sep 14, 1997	295459.94	5.48285	8.81347	9.1565	8.72576	22	0		
23	4 Week Ending Oct 12, 1997	282673.91	5.63235	8.81700	9.1236	8.73507	23	0		
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25	4 Week Ending Dec 7, 1997	517133.13	5.31334	8.76683	9.0085	8.43585	25	1		
26	4 Week Ending Jan 4, 1998	548735.75	5.24625	8.80244	9.3541	8.74934	26	1		
27	4 Week Ending Feb 1, 1998	309180.03	5.61700	8.82411	9.0060	8.55750	27	0		
28	4 Week Ending Mar 1, 1998	365058.16	5.31253	8.89584	9.0322	8.62025	28	0		
29	4 Week Ending Mar 29, 1998	332377.47	5.51241	8.81881	9.2642	8.65954	29	0		
30	4 Week Ending Apr 26, 1998	397646.13	5.34510	8.78724	9.0376	8.54638	30	0		
31	4 Week Ending May 24, 1998	347057.44	5.29312	8.81423	9.1335	8.72441	31	0		
32	4 Week Ending Jun 21, 1998	306700.19	5.64809	9.01062	9.4085	8.89809	32	0		
33	4 Week Ending Jul 19, 1998	319543.63	5.79277	9.17957	9.4845	8.89899	33	0		
34	4 Week Ending Aug 16, 1998	278252.34	5.84261	9.24244	9.5378	8.94921	34	0		
35	4 Week Ending Sep 13, 1998	305355.03	5.91394	9.47098	9.6199	9.09641	35	0		
36	4 Week Ending Oct 11, 1998	280723.97	5.83619	9.20262	9.5447	8.92756	36	0		
37	4 Week Ending Nov 8, 1998	298330.25	5.82040	9.20639	9.4280	8.90023	37	0		
38	4 Week Ending Dec 6, 1998	477141.69	5.63418	9.39055	9.8725	9.14422	38	1		
39	4 Week Ending Jan 3, 1999	522953.97	5.57862	9.48551	10.0094	9.31950	39	1		
40	4 Week Ending Jan 31, 1999	309550.91	5.55900	9.00985	9.3412	8.68611	40	0		
41	4 Week Ending Feb 28, 1999	286848.31	5.66632	8.98101	9.3564	8.64937	41	0		
42	4 Week Ending Mar 28, 1999	322899.63	5.64578	9.19189	9.6509	8.84492	42	0		
43	4 Week Ending Apr 25, 1999	349006.84	5.52580	9.28784	9.6277	8.86344	43	0		
44	4 Week Ending May 23, 1999	319155.44	5.68202	9.41034	9.7096	8.96839	44	0		
45	4 Week Ending Jun 20, 1999	297882.22	5.80217	9.39473	9.8656	9.00466	45	0		
46	4 Week Ending Jul 18, 1999	313499.53	5.64069	9.41897	9.8565	9.04972	46	0		
47	4 Week Ending Aug 15, 1999	266424.09	5.97826	9.58023	9.9749	9.18488	47	0		

48	4 Week Ending Sep 12, 1999	297743.28	5.94454	9.62219	10.0071	9.35394	48	0
49	4 Week Ending Oct 10, 1999	283168.38	5.89541	9.63104	9.9956	9.22733	49	0
50	4 Week Ending Nov 7, 1999	298545.13	5.75017	9.58839	9.8353	9.24256	50	0
51	4 Week Ending Dec 5, 1999	418060.78	5.65471	9.67560	10.1368	9.37348	51	1
52	4 Week Ending Jan 2, 2000	383470.50	5.71589	9.91151	10.7692	9.69078	52	1

* display data attributes;

proc contents data=tmp1.case_wine;

run;

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The CONTENTS Procedure

Data Set Name	TMP1.CASE_WINE	Observations
52		
Member Type	DATA	Variables
8		
Engine	V9	Indexes
0		
Created	12/18/2018 10:49:07	Observation Length
72		
Last Modified	12/18/2018 10:49:07	Deleted
Observations 0		
Protection		Compressed
NO		
Data Set Type		Sorted
NO		
Label	case_wine dataset written by Stat/Transfer Ver. 14.1.1016.0801	

Data Representation WINDOWS_64
Encoding wlatin1 Western (Windows)

Engine/Host Dependent Information

Data Set Page Size	4096
Number of Data Set Pages	2
First Data Page	1
Max Obs per Page	56
Obs in First Data Page	31
Number of Data Set Repairs	0
Filename	J:\MSBA 635 stats 2\case_wine.sas7bdat
Release Created	9.0000M0
Host Created	WIN

Alphabetic List of Variables and Attributes

#	Variable	Type	Len
4	pch	Num	8

5	pcs	Num	8
8	peak	Num	3
6	pm	Num	8
3	pwz	Num	8
2	qwz	Num	8
7	time	Num	3
1	week	Char	26

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The CONTENTS Procedure

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52		
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Alphabetic List of Variables and Attributes

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4	pch	Num	8
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8	peak	Num	3

6	pm	Num	8
3	pwz	Num	8
2	qwz	Num	8
7	time	Num	3
1	week	Char	26

```
* plot data;
```

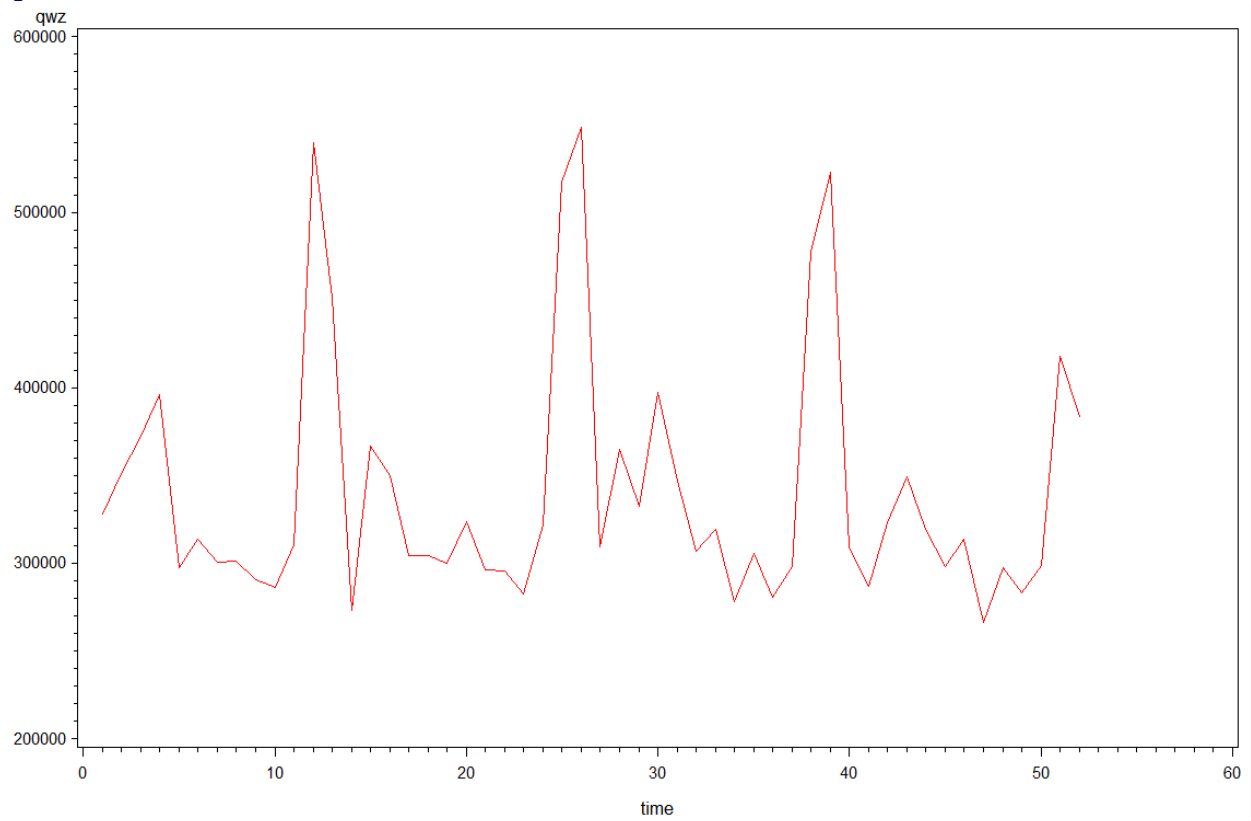
```
symbol1 value=none interpol=join color=red;
```

```
proc gplot data=tmp1.case_wine;
```

```
plot qwz*time=1;
```

```
run;
```

```
quit;
```



```
* construct new variables;
```

```
data wzin;  
set tmp1.case_wine;  
lnqwz=log(qwz);  
lnpwz=log(pwz);  
lnpch=log(pch);  
lnpcs=log(pcs);  
lnpm=log(pm);  
run;
```

```
* estimate regression using proc reg;
```

```
proc reg data=work.wzin;  
model lnqwz = lnpwz lnpch lnpcs lnpm time peak;  
testall: test lnpwz=0, lnpch=0, lnpcs=0, lnpm=0, time=0, peak=0;  
run;  
quit;
```

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The REG Procedure
Model: MODEL1
Dependent Variable: lnqwz

Number of Observations Read	52
Number of Observations Used	52

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	1.47551	0.24592	45.11	<.0001
Error	45	0.24532	0.00545		
Corrected Total	51	1.72083			

Root MSE	0.07383	R-Square	0.8574
Dependent Mean	12.72040	Adj R-Sq	0.8384
Coeff Var	0.58044		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t
Intercept	1	14.78382	0.98070	15.07	<.0001
lnpwz	1	-2.35317	0.42688	-5.51	<.0001
lnpch	1	2.59688	1.13374	2.29	0.0267
lnpcs	1	-0.26161	1.06166	-0.25	0.8065
lnpm	1	-1.50801	0.93607	-1.61	0.1142
time	1	0.00151	0.00240	0.63	0.5341
peak	1	0.35144	0.04172	8.42	<.0001

The REG Procedure

Model: MODEL1

Test testall Results for Dependent Variable lnq wz

Source	DF	Mean Square	F Value	Pr > F
Numerator	6	0.24592	45.11	<.0001
Denominator	45	0.00545		

```
* estimate regression using proc reg;
*two wines were taken out here
*each wine t-test here to see if they are significantly significant
*statistically both of the wines will equal 0
*sas output for restricted model and unrestricted, unrestricted has more
parameters than the restricted model
*regression output tells you how many observations there are overall.
```

```
proc reg data=work.wzin;
model lnq wz = ln pwz ln pch ln pcs ln pm time peak;
testred: test ln pcs=0, ln pm=0;
run;
quit;
```

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The REG Procedure

Model: MODEL1

Dependent Variable: lnq wz

Number of Observations Read	52
Number of Observations Used	52

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	1.47551	0.24592	45.11	<.0001
Error	45	0.24532	0.00545		
Corrected Total	51	1.72083			

Root MSE	0.07383	R-Square	0.8574
Dependent Mean	12.72040	Adj R-Sq	0.8384
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Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t
----------	----	-----------------------	-------------------	---------	---------

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time	1	0.00151	0.00240	0.63	0.5341
peak	1	0.35144	0.04172	8.42	<.0001

*we failed to reject the prices here

*the cab and merlot are very different wines compared to the white zin. The log of cab and log of merlot did not influence the price of white zin.

*you can do all your interpretations here but you don't get your f-value here, just your p-value (0.1802).

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The REG Procedure

Model: MODEL1

Test testred Results for Dependent Variable lnqwz

Source	DF	Mean Square	F Value	Pr > F
Numerator	2	0.00971	1.78	0.1802
Denominator	45	0.00545		

```
* estimate 'restricted' regression using proc reg;
```

```
proc reg data=work.wzin;  
model lnqwz = lnpwz lnpch time peak;  
run;  
quit;
```

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The REG Procedure
Model: MODEL1
Dependent Variable: lnqwz

Number of Observations Read	52
Number of Observations Used	52

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	1.45610	0.36402	64.63	<.0001
Error	47	0.26473	0.00563		
Corrected Total	51	1.72083			

Root MSE	0.07505	R-Square	0.8462
Dependent Mean	12.72040	Adj R-Sq	0.8331
Coeff Var	0.59000		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t
Intercept	1	14.10469	0.91949	15.34	<.0001
lnpwz	1	-2.35989	0.43357	-5.44	<.0001
lnpch	1	1.15527	0.57744	2.00	0.0512
time	1	0.00163	0.00230	0.71	0.4821
peak	1	0.32142	0.03771	8.52	<.0001

*see the errors for the first reg and for that run after the 2 variables that aren't statistically significant are set = 0;

*here you have 52 time periods. This will give you your f-stat and your f-critical

*the finv function here will give you the f-critical values. You created the values again. The same f-stat, p-value from above

*fc=your critical value (3.20432).

*on quiz find the f-critical value on the f-distribution table. Failed to reject the null because it doesn't matter.

*j=degrees of freedom

*the unrestricted model is the full model with 6 intercepts and a slope which is a total of k=7

*SSER>SSEU, bottom of bowl went up but it wasn't statistically significant.

*k=total number of variables

```
data ftest;
set tmp1.case_wine;
sseu = 0.24532;
sser = 0.26473;
j = 2;
n = 52;
k = 7;
fstat = ((sser - sseu)/j)/(sseu/(n - k));
fc = finv(0.95,j,(n - k));
pval_f = 1-probf(fstat,j,(n - k));
run;
```

* print fstat, fcrit, and p-val of ftest;

```
proc print data=work.ftest (obs=1);
var fstat fc pval_f;
run;
quit;
```

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Obs	fstat	fc	pval_f
1	1.78023	3.20432	0.18027

```
* estimate 'restricted' regression using proc reg;
```

```
proc reg data=work.wzin;  
model lnqwz = lnpwz lnpch time peak;  
output out=yhatout p=yhat;  
run;  
quit;
```

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The REG Procedure
Model: MODEL1
Dependent Variable: lnqwz

Number of Observations Read	52
Number of Observations Used	52

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	1.45610	0.36402	64.63	<.0001
Error	47	0.26473	0.00563		
Corrected Total	51	1.72083			

Root MSE	0.07505	R-Square	0.8462
Dependent Mean	12.72040	Adj R-Sq	0.8331
Coeff Var	0.59000		

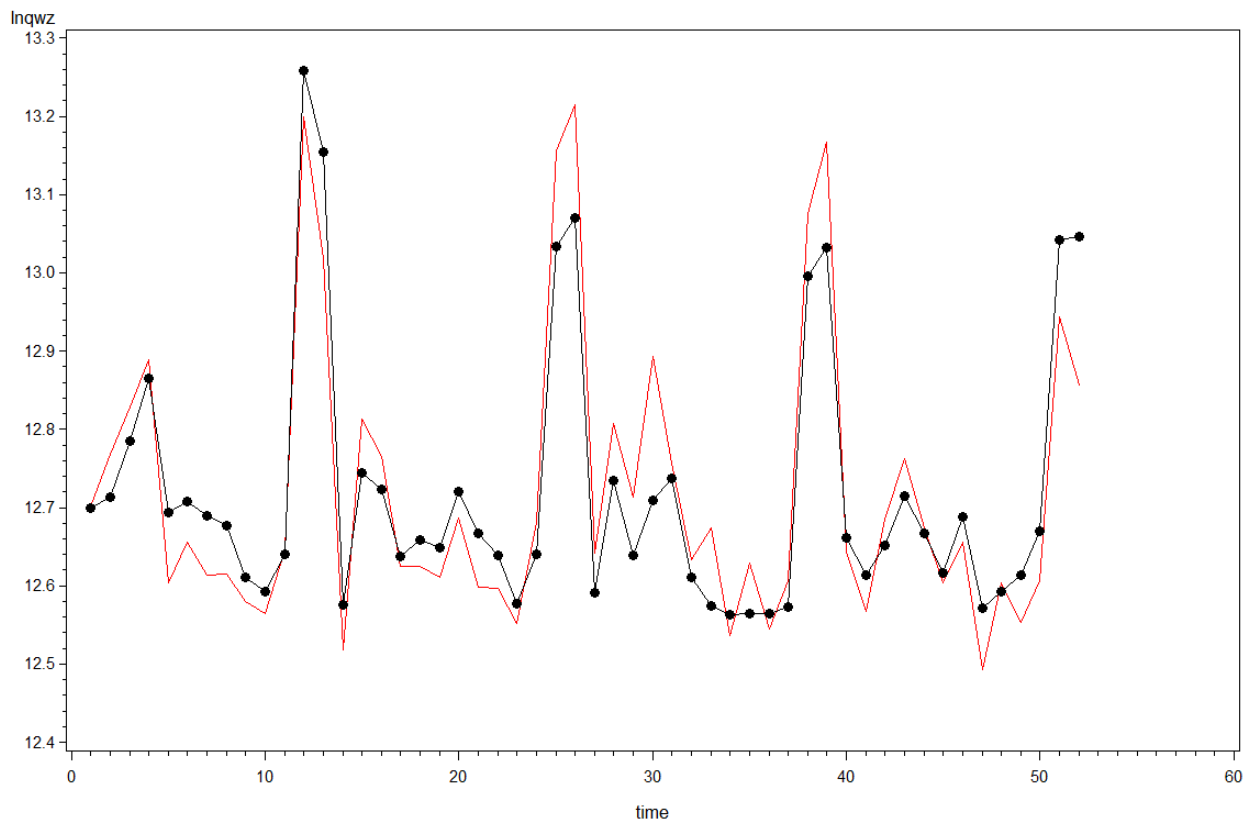
Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t
Intercept	1	14.10469	0.91949	15.34	<.0001
lnpwz	1	-2.35989	0.43357	-5.44	<.0001
lnpch	1	1.15527	0.57744	2.00	0.0512
time	1	0.00163	0.00230	0.71	0.4821
peak	1	0.32142	0.03771	8.52	<.0001

```
* plot data;
```

*the black line with the dots is the predicted, the red line is the actuals
*you can make better decisions if your forecast is better

```
symbol1 value=none interpol=join color=red;  
symbol2 value=dot interpol=join color=black;  
proc gplot data=work.yhatout;  
plot lnq wz*time=1 yhat*time=2 / overlay;  
run;  
quit;
```



```

* construct indicator or dummy variables;

*this is how to construct indicator variables
*the indicator value here is peak
*these are binary values, they equal 1 or 0. Set to 0, however if it equals
the following values it will equal 1.
*when you create this data step it will pass every indicator through.
*when you print that data set you have actually built the far right column
*copy and paste this code over and modify it for our application

data indicator;
set tmp1.case_wine;
ind1 = 0;
if time = 12 or time = 13 or time = 25 or time = 26 or time = 38 or time = 39
or time = 51 or time = 52 then ind1 = 1;
run;

* print data;

proc print data=work.indicator;
run;

```

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Obs	week	qwz	pwz	pch	pcs	pm	time	peak	ind1
1	4 Week Ending Feb 4, 1996	328030.47	4.82092	7.35486	7.4494	7.48548	1	0	0
2	4 Week Ending Mar 3, 1996	350937.91	4.79598	7.35452	7.4015	7.55505	2	0	0
3	4 Week Ending Mar 31, 1996	372483.09	4.65581	7.35238	7.4042	7.36810	3	0	0
4	4 Week Ending Apr 28, 1996	396047.38	4.59832	7.67342	7.8477	7.94540	4	0	0
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6	4 Week Ending Jun 23, 1996	313780.38	4.97526	7.84120	8.1346	7.91366	6	0	0
7	4 Week Ending Jul 21, 1996	300815.69	5.05715	7.96897	8.2394	8.05824	7	0	0
8	4 Week Ending Aug 18, 1996	301216.88	5.06003	7.87916	8.2217	7.77448	8	0	0
9	4 Week Ending Sep 15, 1996	290824.97	5.24157	7.99181	8.2043	8.13074	9	0	0
10	4 Week Ending Oct 13, 1996	286408.50	5.25932	7.91214	7.9870	7.93152	10	0	0
11	4 Week Ending Nov 10, 1996	310627.34	5.19036	8.01505	8.2129	8.11458	11	0	0
12	4 Week Ending Dec 8, 1996	539698.19	4.61598	8.13611	8.3450	8.19679	12	1	1
13	4 Week Ending Jan 5, 1997	450740.50	4.90721	8.41282	8.7656	8.71631	13	1	1
14	4 Week Ending Feb 2, 1997	273374.53	5.42279	8.25341	8.4667	8.30097	14	0	0
15	4 Week Ending Mar 2, 1997	366885.50	5.09973	8.40755	8.6657	8.28217	15	0	0
16	4 Week Ending Mar 30, 1997	350086.28	5.09602	8.23675	8.4686	8.12046	16	0	0
17	4 Week Ending Apr 27, 1997	304163.50	5.33140	8.36981	8.5524	8.21876	17	0	0
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21	4 Week Ending Aug 17, 1997	296021.75	5.40952	8.80202	8.9226	8.65650	21	0	0
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25	4 Week Ending Dec 7, 1997	517133.13	5.31334	8.76683	9.0085	8.43585	25	1	1
26	4 Week Ending Jan 4, 1998	548735.75	5.24625	8.80244	9.3541	8.74934	26	1	1
27	4 Week Ending Feb 1, 1998	309180.03	5.61700	8.82411	9.0060	8.55750	27	0	0
28	4 Week Ending Mar 1, 1998	365058.16	5.31253	8.89584	9.0322	8.62025	28	0	0
29	4 Week Ending Mar 29, 1998	332377.47	5.51241	8.81881	9.2642	8.65954	29	0	0

30	4 Week Ending Apr 26, 1998	397646.13	5.34510	8.78724	9.0376	8.54638	30	0	0
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40	4 Week Ending Jan 31, 1999	309550.91	5.55900	9.00985	9.3412	8.68611	40	0	0
41	4 Week Ending Feb 28, 1999	286848.31	5.66632	8.98101	9.3564	8.64937	41	0	0
42	4 Week Ending Mar 28, 1999	322899.63	5.64578	9.19189	9.6509	8.84492	42	0	0
43	4 Week Ending Apr 25, 1999	349006.84	5.52580	9.28784	9.6277	8.86344	43	0	0
44	4 Week Ending May 23, 1999	319155.44	5.68202	9.41034	9.7096	8.96839	44	0	0
45	4 Week Ending Jun 20, 1999	297882.22	5.80217	9.39473	9.8656	9.00466	45	0	0
46	4 Week Ending Jul 18, 1999	313499.53	5.64069	9.41897	9.8565	9.04972	46	0	0
47	4 Week Ending Aug 15, 1999	266424.09	5.97826	9.58023	9.9749	9.18488	47	0	0
48	4 Week Ending Sep 12, 1999	297743.28	5.94454	9.62219	10.0071	9.35394	48	0	0
49	4 Week Ending Oct 10, 1999	283168.38	5.89541	9.63104	9.9956	9.22733	49	0	0
50	4 Week Ending Nov 7, 1999	298545.13	5.75017	9.58839	9.8353	9.24256	50	0	0
51	4 Week Ending Dec 5, 1999	418060.78	5.65471	9.67560	10.1368	9.37348	51	1	1
52	4 Week Ending Jan 2, 2000	383470.50	5.71589	9.91151	10.7692	9.69078	52	1	1