

Outliers and Influential Observations - Wine Consumption and Population

US States 2013 X=Pop (millions) Y=Wine Consumption (Millions of Liters)

ID	Pop(X)	Wine(Y)	SDR	dfb.1	dfb.pop	dffit	cov.r	cook.d	hat	inf	State
1	4.829479	28.97687	-0.3775	-0.0469	0.0105	-0.0544	1.0570	0.0015	0.0204		Alabama
2	0.736879	8.031981	0.3439	0.0621	-0.0384	0.0622	1.0710	0.0020	0.0317		Alaska
3	6.624617	64.25878	0.0578	0.0058	0.0005	0.0082	1.0630	0.0000	0.0197		Arizona
4	2.958663	12.42638	-0.2496	-0.0374	0.0165	-0.0390	1.0650	0.0008	0.0238		Arkansas
5	38.3352	536.6928	5.8936	-2.5478	5.0700	5.1869	0.6220	7.9700	0.4365 *		California
6	5.267603	45.82815	-0.0340	-0.0040	0.0006	-0.0049	1.0630	0.0000	0.0200		Colorado
7	3.596003	51.78244	0.6803	0.0959	-0.0360	0.1029	1.0460	0.0054	0.0223		Connecticut
8	0.925395	12.49283	0.4118	0.0732	-0.0443	0.0735	1.0680	0.0027	0.0308		Delaware
9	0.649165	16.68354	0.6246	0.1135	-0.0708	0.1137	1.0590	0.0065	0.0320		District of Columbia
10	19.58202	242.8171	1.0604	-0.0824	0.2990	0.3373	1.0960	0.0567	0.0919		Florida
11	9.984938	58.91113	-1.2006	-0.0658	-0.0925	-0.1938	1.0080	0.0186	0.0254		Georgia
12	1.406481	18.4249	0.4268	0.0730	-0.0417	0.0736	1.0650	0.0028	0.0289		Hawaii
13	1.612011	12.89609	0.1998	0.0336	-0.0187	0.0340	1.0700	0.0006	0.0281		Idaho
14	12.87951	131.371	-0.0316	-0.0005	-0.0043	-0.0062	1.0830	0.0000	0.0376		Illinois
15	6.569102	40.07152	-0.6216	-0.0626	-0.0047	-0.0880	1.0460	0.0039	0.0197		Indiana
16	3.09193	14.53207	-0.2320	-0.0343	0.0147	-0.0360	1.0650	0.0007	0.0235		Iowa
17	2.892821	9.257027	-0.3198	-0.0482	0.0215	-0.0502	1.0630	0.0013	0.0240		Kansas
18	4.400477	17.16186	-0.5803	-0.0754	0.0212	-0.0848	1.0500	0.0037	0.0209		Kentucky
19	4.626402	26.37049	-0.3870	-0.0491	0.0124	-0.0561	1.0570	0.0016	0.0206		Louisiana
20	1.329076	13.82239	0.3186	0.0549	-0.0316	0.0552	1.0690	0.0016	0.0292		Maine
21	5.931129	52.78705	-0.0481	-0.0053	0.0003	-0.0068	1.0630	0.0000	0.0196		Maryland
22	6.706786	113.3447	1.4738	0.1457	0.0152	0.2090	0.9730	0.0213	0.0197		Massachusetts
23	9.898982	75.23226	-0.6882	-0.0385	-0.0518	-0.1105	1.0480	0.0062	0.0251		Michigan
24	5.418521	45.51558	-0.0917	-0.0107	0.0015	-0.0130	1.0630	0.0001	0.0199		Minnesota
25	2.990482	8.37335	-0.3770	-0.0563	0.0246	-0.0588	1.0610	0.0018	0.0238		Mississippi
26	6.042711	43.50752	-0.3511	-0.0378	0.0011	-0.0497	1.0580	0.0013	0.0196		Missouri
27	1.014314	8.621669	0.2705	0.0478	-0.0286	0.0479	1.0720	0.0012	0.0305		Montana
28	1.868559	9.342795	0.0141	0.0023	-0.0012	0.0024	1.0710	0.0000	0.0272		Nebraska
29	2.786464	40.96102	0.6304	0.0959	-0.0438	0.0995	1.0510	0.0050	0.0243		Nevada
30	1.322687	25.92467	0.6728	0.1159	-0.0669	0.1167	1.0530	0.0069	0.0292		New Hampshire
31	8.899162	132.5975	1.3124	0.0910	0.0720	0.1993	0.9940	0.0196	0.0225		New Jersey
32	2.085193	14.38783	0.0894	0.0145	-0.0075	0.0147	1.0700	0.0001	0.0264		New Mexico
33	19.67355	234.1152	0.7627	-0.0603	0.2170	0.2441	1.1210	0.0300	0.0929		New York
34	9.84159	64.95449	-0.9717	-0.0551	-0.0720	-0.1555	1.0280	0.0121	0.0250		North Carolina
35	0.724019	3.692497	0.2223	0.0402	-0.0249	0.0402	1.0740	0.0008	0.0317		North Dakota
36	11.57002	83.30416	-1.0062	-0.0336	-0.1100	-0.1807	1.0320	0.0163	0.0312		Ohio
37	3.852415	17.33587	-0.3972	-0.0546	0.0189	-0.0593	1.0580	0.0018	0.0218		Oklahoma
38	3.925751	47.89416	0.4596	0.0627	-0.0212	0.0684	1.0560	0.0024	0.0217		Oregon
39	12.78134	71.57549	-1.7899	-0.0305	-0.2410	-0.3513	0.9510	0.0590	0.0371		Pennsylvania
40	1.053033	14.74246	0.4354	0.0766	-0.0457	0.0770	1.0660	0.0030	0.0303		Rhode Island
41	4.767894	29.08415	-0.3545	-0.0443	0.0103	-0.0512	1.0580	0.0013	0.0204		South Carolina
42	0.844922	4.22461	0.1983	0.0355	-0.0217	0.0356	1.0740	0.0006	0.0312		South Dakota
43	6.494821	35.07203	-0.7430	-0.0756	-0.0044	-0.1052	1.0390	0.0056	0.0196		Tennessee
44	26.47353	132.3676	-6.6904	1.2315	-3.0200	-3.1931	0.3430	2.6900	0.1855 *		Texas
45	2.902663	9.288522	-0.3221	-0.0485	0.0216	-0.0505	1.0630	0.0013	0.0240		Utah
46	0.62714	10.97495	0.4653	0.0847	-0.0530	0.0848	1.0670	0.0037	0.0321		Vermont
47	8.262692	88.4108	0.2237	0.0174	0.0094	0.0330	1.0630	0.0006	0.0213		Virginia
48	6.968006	91.28088	0.7275	0.0693	0.0113	0.1035	1.0400	0.0054	0.0198		Washington
49	1.853231	4.447754	-0.1222	-0.0201	0.0108	-0.0204	1.0710	0.0002	0.0272		West Virginia
50	5.742854	52.25997	-0.0025	-0.0003	0.0000	-0.0004	1.0630	0.0000	0.0197		Wisconsin
51	0.582684	3.029957	0.2491	0.0455	-0.0286	0.0455	1.0740	0.0011	0.0323		Wyoming

Model 1: Standard Model

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-12.1211	6.5213	-1.859	0.0691 .
pop	11.2257	0.6991	16.057	<2e-16 ***

Residual standard error: 34.8 on 49 degrees of freedom
 Multiple R-squared: 0.8403, Adjusted R-squared: 0.837
 F-statistic: 257.8 on 1 and 49 DF, p-value: < 2.2e-16

Model 2: Regression Through the Origin

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
pop	10.362	0.535	19.37	<2e-16 ***

Residual standard error: 35.64 on 50 degrees of freedom
Multiple R-squared: 0.8824, Adjusted R-squared: 0.88
F-statistic: 375.1 on 1 and 50 DF, p-value: < 2.2e-16

Model 3: Regression with Origin – California Removed

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.6657	5.4676	0.122	0.904
pop[State != "California"]	8.4985	0.7096	11.976	5.02e-16 ***

Residual standard error: 26.78 on 48 degrees of freedom
Multiple R-squared: 0.7492, Adjusted R-squared: 0.744
F-statistic: 143.4 on 1 and 48 DF, p-value: 5.023e-16

Model 4: Regression Through Origin – California Removed

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
pop[State != "California"]	8.5609	0.4865	17.59	<2e-16 ***

Residual standard error: 26.51 on 49 degrees of freedom
Multiple R-squared: 0.8634, Adjusted R-squared: 0.8606
F-statistic: 309.6 on 1 and 49 DF, p-value: < 2.2e-16

Wine Consumption vs Population

