100

Exam 4, Feb 13, 2014 Name: Adam Carlton

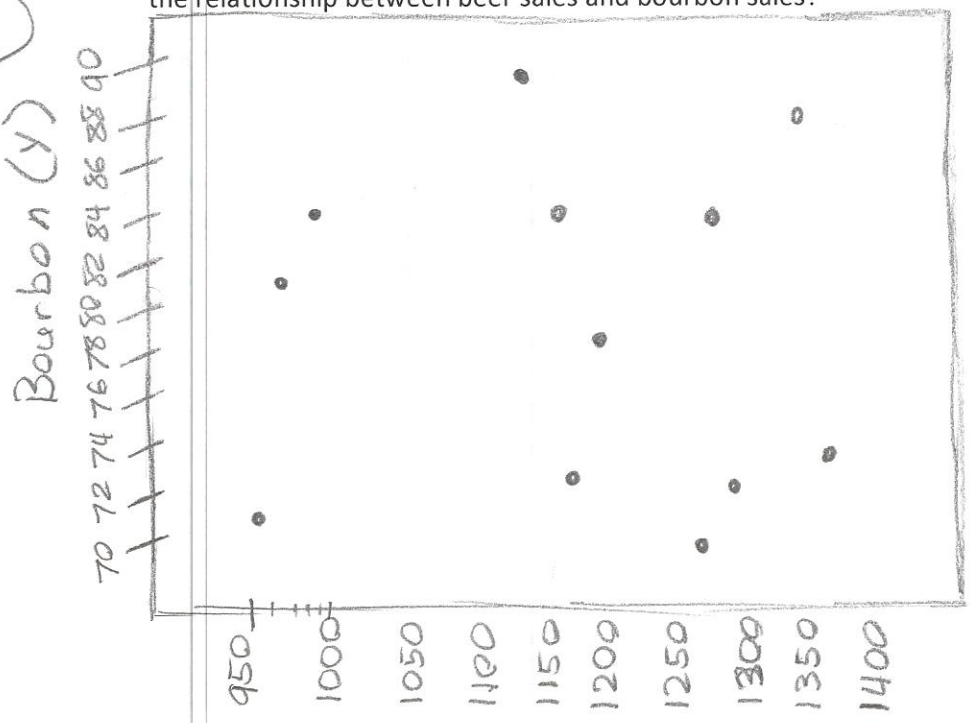
Open book. Show All Work!

A liquor store wants to investigate the relationship between beer sales and bourbon sales. The manager has collected the following data.

Week	Beer (x)	Bourbon (y)	x^2	y^2	xy	$\hat{y}$	$(y-\hat{y})$	$(y-\hat{y})^2$
1	1149	89	1320201	7921	102261	79.13	9.86	97.32
2	971	81	942841	6561	78651	79.49	1.51	2.29
3	989	84	978121	7056	83076	79.45	4.55	20.69
4	966	71	933156	5041	68586	79.50	-8.50	72.20
5	1172	73	1373584	5329	85556	79.09	-6.09	37.08
6	1261	70	1590121	4900	88270	78.91	-8.91	79.44
7	1288	72	1658944	5184	92736	78.86	-6.86	47.06
8	1199	79	1437601	6241	94721	79.04	-0.04	.0012
9	1366	74	1865956	5476	101084	78.70	-4.70	22.14
10	1271	84	1615441	7056	106764	78.89	5.11	26.08
11	1346	88	1811716	7744	118448	78.74	9.25	85.66
12	1172	84	1373584	7056	98448	79.09	4.90	24.11
	14150	949	16901266	75565	1118601	948.9	.097	514.07

1. Produce a scatter plot.
2. Calculate the Pearson Correlation Coefficient. $r = -.0406$
3. Determine the equation of the regression line. $\hat{y} = 81.41 + -0.00198x$
4. Based on the regression line, calculate predicted Bourbon sales and residuals.
5. Calculate the sum of squares error and the standard error of the estimate. $SSE = 514.07$ $Se = 7.17$
6. Calculate the coefficient of determination. $r^2 = 0.0016$
7. Assume the liquor store manager has never taken a course in statistics. How would you describe the relationship between beer sales and bourbon sales?

1)



7) Almost zero correlation. Beer has little if any effect on sale of Bourbon

2) $$\frac{1118601 - \frac{(14150)(949)}{12}}{\sqrt{\left(16901266 - \frac{(14150)^2}{12}\right)\left(75565 - \frac{(949)^2}{12}\right)}}$$

$r = -.0406$

$$\frac{-428.166}{\sqrt{(216057.67)(514.92)}} = \frac{-428.166}{10547.62}$$

3) $SS_{xy} = 1118601 - \frac{(14150)(949)}{12} = -428.167$

$SS_{xx} = 16901268 - \frac{(14150)^2}{12} = 216057.667$

$b_1 = -.00198$

$b_1 = \frac{SS_{xy}}{SS_{xx}} = \frac{-428.167}{216057.667}$

$b_0 = \frac{949}{12} - (-.00198)\frac{14150}{12} = 79.08 - (-2.33)$

$b_0 = 81.41$

$\hat{y} = 81.41 + -0.00198x$

5) $SSE = 514.07$

$S_e = \sqrt{\frac{514.07}{12-2}} = S_e = 7.17$

6) $r^2 = 1 - \frac{SSE}{SS_{yy}}$ $\quad SS_{yy} = 75565 - \frac{(949)^2}{12} = 514.91$

$SS_{xy} = 514.91$

$r^2 = 1 - \frac{514.07}{514.91}$

$r^2 = .0016$