

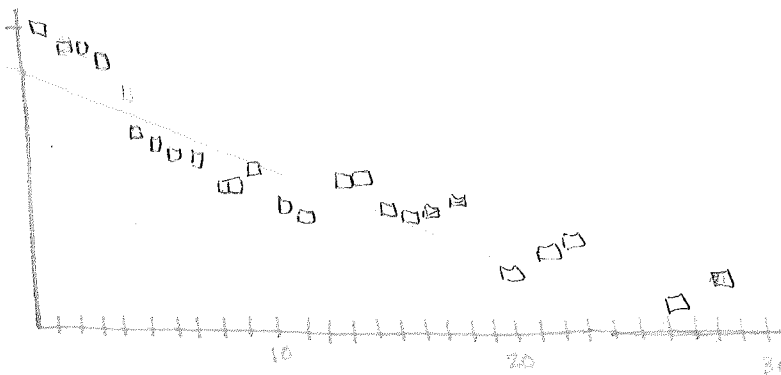
Homework #4 - Residuals

NAME: ANSWER KEY

The table below lists the draft number of each player from the first round of the 1991 NBA draft and the annual salary (in \$) of the contract that the player signed. The two missing entries are for players who signed with European teams.

Pick #	Salary	Pick #	Salary	Pick #	Salary
1	3,333,333	10	1,010,652	19	828,750
2	2,900,000	11	997,120	20	740,000
3	2,867,100	12	1,370,000	21	775,000
4	2,750,000	13	817,000	22	180,000
5	2,458,333	14	675,000	23	550,000
6	1,736,250	15	*	24	610,000
7	1,590,000	16	1,120,000	25	*
8	1,500,000	17	1,120,000	26	180,000
9	1,400,000	18	875,000	27	605,000

1. Create a scatterplot (sketch it here) and describe the plot.



FORM: Somewhat Linear  
 Direction: Negative  
 Strength: Strong

2. Compute the LSR line, and  $r$  and  $r^2$ . Add the line to your plot.

LSRL:  $\hat{y} = -98957.22x + 2657443.08$   
 $r = -.8869$   
 $r^2 = .7866$

MAKE sure line goes through  $\bar{y}$ -int &  $(\bar{x}, \bar{y})$   
 $(0, 2657443.08)$  &  $(13.52, 1319541.52)$   
 2 VAR stats

3. What percent of the change in salary is explained by the change in the draft number?

$r^2 =$  coefficient of determination  $-78\%$  of the change in salary can be

4. What is the slope? Interpret it in context of the problem.

Explained by the change in draft #  
y-variable / x-variable

slope =  $-98957.22$

As the draft picks continue, the salary decreases by \$98,957.22.

5. What is the y-intercept? Interpret this in context of the problem.

y-int:  $2657443.08$

A draft pick of zero receives a salary of \$2,657,443.08

6. Calculate the predicted salary for a player picked 12<sup>th</sup>.

$\hat{y}_{12} = -98957.22(12) + 2657443.08$   
 $\hat{y}_{12} = \$1,469,956.50$

7. Calculate the residual for the previous prediction.

Residual = Actual - Prediction      Residual =  $1370000 - 1469956.5$   
 $R = y - \hat{y}$        $P_{12} = -99956.49$

8. Was your prediction an overestimate or an underestimate?

overestimate

9. What salary would the line predict for the players picked 15<sup>th</sup> and 25<sup>th</sup>?

$\hat{y}_{15} = \$1,730,848.0$

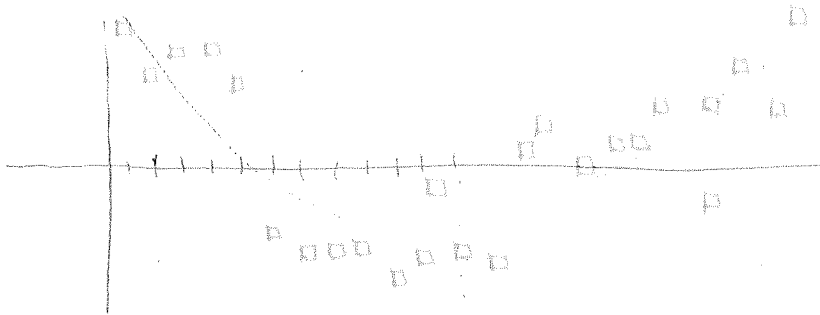
$\hat{y}_{25} = \$1,835,121.68$

10. By how much does the LSR line predict the salary to drop for each additional draft number? (each change of 1 in the x-variable) THIS IS THE SLOPE!

$\$98,957.22$

11. Create a residual plot (sketch it here).

This looks like it is curved!



12. Does a linear model appear to be the best model? Why or why not?

No it does not because there is a pattern present in the Residual Plot

13. For observations with positive residual values, is the actual salary greater or less than the predicted salary? Are these over- or underestimates?

Actual salary is greater than the predicted salary. Underestimate

14. For observations with negative residual values, is the actual salary greater or less than the predicted salary? Are these over- or underestimates?

Actual salary is less than the predicted salary. Overestimate