Chapter 12

12.2:

Fitting a straight line to a set of data yields the prediction line $\hat{Y}_i = 7 + 2X_i$.

The values of X used to find the prediction line range from 1 to 25

a)X=3	b)X=-3	c)X=0	d)X=24
Yes	No	No	Yes

12.5:

Zimmer's posts restaurant ratings for various locations in the United States. a sample of 100 restaurants in New York city was selected.

a)Develop a regression model to predict the cost per person? b_0=-46.7718 , b_1= 1.4963

$$\hat{Y} = -46.7718 + 1.4963x$$

b) Predict the mean cost per person for a restaurant when $X_i = 50$

$\hat{Y} = -46.7718 + 1.4963(50) = \$28.04$

12.17

If SSR=9740.062, and SST=17844.75, from a sample of 100

a) Compute the coefficient of determination, and interpret its meaning.

r^2 =9740.062/17844.75= 0.5458.

So, 54.58% of the variation in the cost of a restaurant meal can be explained by the variation in the summated rating.

b) Determine the standard error of the estimate

$$S_{YX} = \sqrt{\frac{SSE}{n-2}} = \sqrt{\frac{8104.688}{98}} = 9.0940$$

SSE = SST – SSR = 17844.75 - 9740.062 = 8104.688

12.43

based on 12.5, $b_1 = 1.4963$ and S_{b1}=0.1379

a) at the 0.05 level of significance. Is there evidence of liner relationship between rating of the restaurant and the cost of the meal

1- $H_0 : \beta_1 = 0$ $H_1 : \beta_1 \neq 0$

2- α=0.05

3- $t_{STAT} = \frac{b_1 - \beta_1}{S_{b_1}} = \frac{1.4963-0}{0.1379}$ =10.85

4- $t_{0.05/2,98} = \pm 1.9845$

5- Since $t_{stat} > 1.9845$, reject H_0 at 5% level of significance.

There is evidence of a linear relationship between the cost of a meal and the summated rating.

b) Construct a 95% confidence interval estimate of the population slope, β1.

$$b_1 \pm t_{\alpha/2} S_{b_1}$$

1.4963±1.9845 (0.1379)

$1.2227 \leq \beta_1 \leq 1.7699$

12.51

The table below contains the calories and fat, in grams, of seven different types of coffee

Coffee	Calories(X)	Fat(Y)
1	238	7.9
2	259	3.4
3	346	22.2
4	347	19.8
5	419	16.3
6	505	21.5
7	527	18.5

a) At the 0.05 level of significance. is there a significant linear relationship between calories and fat? (use T-test)

	Coefficient	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-1.2703	8.056900953	-0.157668478	0.880887605	-21.98124255	19.440604	-21.9812425	19.44060393
X Variable 1	0.04487	0.020586676	2.17939153	0.081175276	-0.008053308	0.0977862	-0.00805331	0.097786163

1- $H_0 : \beta_1 = 0$ $\qquad$ $H_1 : \beta_1 \neq 0$

2- α=0.05

3- t_{STAT}=2.17939

4-$\pm\ t_{\alpha/2} = \pm\ 2.5706$

5- Since $-2.5706 < t_{stat} < 2.5706$, do not reject H_0. There is insufficient evidence to conclude that there is a significant linear relationship between calories and fat.

b)At the 0.05 level of significance. is there a significant linear relationship between calories and fat? (use *F* test)

ANOVA

	df	*SS*	*MS*	*F*
Regression	1	152.491373	152.491373	4.749747443
Residual	5	160.5257699	32.10515397	
Total	6	313.0171429		

1- $H_0 : \beta_1 = 0$ $\quad\quad\quad\quad$ $H_1 : \beta_1 \neq 0$

2- α=0.05

3- $F_{STAT} = \frac{MSR}{MSE} = \frac{152.4913}{32.1051} = 4.7497$

4-$F_{0.05,1,5} = 6.61$

5- Since $F_{0.05,1,5} = 6.61 > F_{STAT}$, do not reject H_0. There is insufficient evidence to conclude that there is a significant linear relationship between calories and fat.