Section 11/23

1 Question 12.3

Refer to the regression of active pulse rate on resting pulse rate in Section 12.2. Here are the estimated values again, along with some additional data.

```
active = pulse.column(0)
resting = pulse.column(1)

slope, intercept, r, p, se_slope = stats.linregress(x=resting, y=active)
slope, intercept, r, p, se_slope
```

```
(1.142879681904831,
 13.182572776013345,
 0.6041870881060092,
 1.7861044071652305e-24,
 0.09938884436389145)
```

```
mean_active, sd_active = np.mean(active), np.std(active)
mean_active, sd_active
```

```
(91.29741379310344, 18.779629284683832)
```

```
mean_resting, sd_resting = np.mean(resting), np.std(resting)
mean_resting, sd_resting
```

```
(68.34913793103448, 9.927912546587986)
```

a) Use the Data 8 formulas for the slope and intercept of the regression line (proved in the previous chapter) and confirm that you get the same values as reported by stats.linregress.

b) Find the regression estimate of the active pulse rate of a student whose resting pulse rate is 70.

c) Find the SD of the residuals. This is roughly the error in the estimate in Part b.

2 Question 12.4

Restrict the population of students in the previous exercise just to the male smokers.

Below is a summary of the regression of the active pulse rate on the resting pulse rate for these data. Since the population consists just of male smokers, the parameters in the model might have different values from those in the previous exercise.

a) Find the correlation between the active and resting pulse rates for these data and compare it with the corresponding value for all students.

b) Show the calculation that leads to the displayed confidence interval for the true slope of Rest.

c) Use the displayed confidence interval for the true intercept to provide the conclusion of a test of hypotheses $H_0 : \beta_0 = 0$ versus $H_A : \beta_0 \neq 0$ at the 5% level. Explain your reasoning.

d) Show the calculation that leads to the displayed value of $P > |t|$ for the intercept. Is the value consistent with your answer to Part c?

e) Use the displayed results for the slope of Rest to provide the conclusion of a test of hypotheses $H_0 : \beta_1 = 0$ versus $H_A : \beta_1 \neq 0$ at the 1% level. Explain your reasoning.

OLS Regression Results

Dep. Variable:	Active	**R-squared:**	0.645
Model:	OLS	**Adj. R-squared:**	0.622
Method:	Least Squares	**F-statistic:**	27.29
Date:	Sat, 07 Dec 2019	**Prob (F-statistic):**	0.000103
Time:	12:25:30	**Log-Likelihood:**	-61.906
No. Observations:	17	**AIC:**	127.8
Df Residuals:	15	**BIC:**	129.5
Df Model:	1		
Covariance Type:	nonrobust		

	coef	**std err**	**t**	**P>|t|**	**[0.025**	**0.975]**
const	9.9360	16.345	0.608	0.552	-24.903	44.775
Rest	1.1591	0.222	5.224	0.000	0.686	1.632

Omnibus:	2.279	**Durbin-Watson:**	1.114
Prob(Omnibus):	0.320	**Jarque-Bera (JB):**	1.423
Skew:	0.456	**Prob(JB):**	0.491
Kurtosis:	1.915	**Cond. No.**	505.