

Week Five Homework Exercise

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Exercise One

Earlier in the course we studied the multiple regression relationship of SBP (Y) to AGE (X_1), SMK (X_2), and QUET (X_3) using the data in Homework 1 of Week 2.

If you need to refer to the dataset from Week 2 homework, you can download the [CSV file](#).

Three regression models will now be considered:

Model	Independent Variables Used
1	AGE (X_1)
2	AGE (X_1), SMK (X_2),
3	AGE (X_1), SMK (X_2), QUET (X_3)

First, use your computer to generate each of the above models.

Then, complete the following:

A. Use model 3 to determine:

1. What is the predicted SBP for a 50-year old smoker with a quetelet (QUET) index of 3.5?
2. What is the predicted SBP for a 50-year-old non-smoker with a quetelet index of 3.5?
3. For 50-year-old smokers, give an estimate of the change in SBP corresponding to an increase in quetelet index from 3.0 to 3.5.

B. Using the ANOVA tables, compute and compare the R^2 -values for models 1,2, and 3.

C. Conduct (separately) the overall F -tests for significant regression under models 1,2, and 3. Be sure to state your null hypothesis for each model in terms of regression coefficients.

Exercise Two

The accompanying table presents the weight (X_1), age (X_2) and plasma lipid levels of total cholesterol (Y) for a hypothetical sample of 25 patients with hyperlipoproteinemia before drug therapy.

Patient	Total Cholesterol (\bar{Y}) (mg/100 ml)	Weight (X_1) (kg)	Age (X_2) (yr)
1	354	84	46
2	190	73	20
3	405	65	52
4	263	70	30
5	451	76	57
6	302	69	25
7	288	63	28
8	385	72	36
9	402	79	57
10	365	75	44
11	209	27	24
12	290	89	31
13	346	65	52
14	254	57	23
15	395	59	60
16	434	69	48
17	220	60	34
18	374	79	51
19	308	75	50
20	220	82	34
21	311	59	46
22	181	67	23
23	274	85	37
24	303	55	40
25	244	63	30

If desired, you may download the data for this exercise in this [CSV file](#)

Complete the following six questions:

1. Generate the separate straight-line regressions of Y on X_1 (model 1) and Y on X_2 (model 2).

2. Generate the regression model of Y on both X_1 and X_2
3. For each of the models in questions 1 and 2, determine the predicted cholesterol level \hat{Y} for patient 4 (with $Y = 263$, $X_1 = 70$, and $X_2 = 30$) and compare these predicted cholesterol levels with the observed value. *Comment on your findings in the [homework forum](#).*
4. Carry out the overall F -test for the two-variable model and the partial F -test for the addition of X_1 to the model, given that X_2 is already in the model.
5. Compute and compare the R^2 -values for each of the three models considered in questions 1 and 2.
6. Based on the results obtained in questions 1-5, what do you consider to be the best predictive model involving either one or both of the independent variables considered? Why? *Discuss your response in the [homework forum](#).*

You can download all homework assignments for week 5 [here](#)

For help and answers to this week's exercises, click the button below to visit the solutions page.

[Solutions Page](#)

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