

Assignment ON2

Elmer V Villanueva

Due at 3:55 PM on Monday 09 March 2020

Instructions

This assignment consists of many questions. You must attempt all questions. All answers must be submitted on ICE. The preferred submission format is an RMD file, but other typical file types are allowed.

Data

Fifteen specimens of human sera were tested comparatively for tuberculin antibody by a new method. The readings were compared to estimated derived from the old method. The results are shown in the table below.

Table. Tuberculin antibody concentrations estimated from new and old laboratory methods.

OLD	NEW
2041.7	12302.7
257.0	6918.3
524.8	4466.8
257.0	1584.9
128.8	933.3
128.8	1659.6
1023.3	9120.1
134.9	575.4
257.0	2630.3
125.9	2398.8
257.0	1905.5
123.0	851.1
1000.0	3467.4
120.2	1380.4
128.8	575.4

The new method was developed because the old method, while more accurate, used expensive reagents. The investigators wish to see if estimates from the new method could be used to predict antibody levels from the old method.

Questions

1. (10 marks) Produce a properly formatted scatterplot of the data.
2. (5 marks) Regress the readings from the old method on the readings from the new method. Report estimates for the intercept and slope.
3. (3 marks) Test the null hypothesis that the intercept is zero using $\alpha = 0.05$.

4. (3 marks) Test the null hypothesis that the slope is zero using $\alpha = 0.05$.
5. (3 marks) Produce a 95% confidence interval for the slope.
6. (5 marks) Interpret this 95% confidence interval.

The readings from both methods have a wide range. It is typical in antibody concentration studies to take the logarithm of the data.

7. (5 marks) Transform the data by taking the base-10 logarithm of each datum. Present this transformation in a new, properly formatted table.
8. (10 marks) Produce a properly formatted scatterplot of the transformed data.
9. (5 marks) Regress the transformed readings from the old method on the transformed readings from the new method. Report the regression equation.
10. (3 marks) Test the null hypothesis that the intercept of this new regression is zero using $\alpha = 0.05$.
11. (3 marks) Test the null hypothesis that the slope of this new regression is zero using $\alpha = 0.05$.
12. (5 marks) Are your tests of hypotheses in (3) and (4) consistent with your tests in (9) and (10)? Discuss.
13. (3 marks) Produce a 95% confidence interval for the slope of this new regression.
14. (5 marks) Interpret this 95% confidence interval.
15. (5 marks) Which of these two regression equations is more appropriate? Why?

THE END