



Exam 1

Name: _____

Note: You have 120 minutes to solve the exam. Record your name and code on your answer sheet.

1. [10 Points] From a sample of 10 observations the following results were obtained

$$\sum Y_i = 1110 \quad \sum X_i = 1700 \quad \sum X_i Y_i = 205500 \quad \sum X_i^2 = 322000 \quad \sum Y_i^2 = 132100$$

with the correlation coefficient $r = 0,9758$. But checking these calculations revealed that two pairs of observations were recorded:

$$(Y, X) = (90, 120)$$

$$(Y, X) = (140, 220)$$

en lugar de

$$(Y, X) = (80, 110)$$

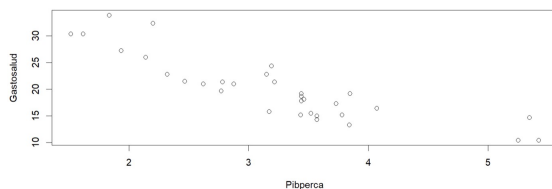
$$(Y, X) = (150, 210)$$

What will be the effect of this error on r ? Get the correct r .

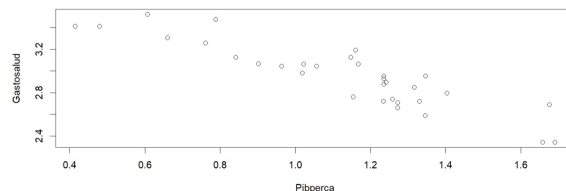
2. [10 Points] A regression analysis has been carried out to assess the relationship between GDP per capita in thousands of dollars (X) and social spending on health in thousands of dollars (Y) in a sample of 32 countries. The results of the regression analysis include a coefficient of determination of 0.75 and a correlation coefficient of -0.8676.

Variable	Mean	Variance
GDP per capita	3.2172	0.9573
Social spending on health	20.0906	36.3241

Lin-Lin



Log-Log



- What is the equation of the regression line?
- Suppose that we now want to estimate the model with the units of the variables in millions of dollars, what is the equation of the regression line?

- c) If a Log-Log transformation is applied to the model, the coefficient of determination decreases or increases. In this specific case according to the graph. argue.
3. **[10 Points]** Use the WAGE2 database from Wooldridge's library to estimate a simple regression that explains monthly salary (wage) in terms of intelligence quotient (IQ) score.

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En R:
library(wooldridge)
data(wage2)
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- a) Is the IQ variable significant in explaining salary?
- b) What do the estimators of $\hat{\beta}_0$ and $\hat{\beta}_1$ interpret?
- c) Interpret the R^2
4. **[10 Points]** In the regression $Y_i = \beta_0 + \beta_1 X + u$ suppose that each value of X is multiplied by a constant, 7, for example. Will this change the residuals and fitted values of Y ? explain. What happens if a constant value, say 7, is added to each value of X ? demonstrate.
5. **[10 Points]** The following model $Y_i = \beta_0 + \beta_1 X_i + u_i$ has been estimated with a sample of 935 observations, in such a way that the anova table is as follows.

Fuente Var.	Suma de Cuadr.	gl	Cuadrados Med.	F	pvalue
Modelo	14589783	1	14589783		2.2e-16
Error	138126386				
Total					

- a) Complete the table
- b) Based on this information we can ensure that X has a significantly linear effect on Y
- c) Calculate R^2