

Homework 1 Answers

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1. $\frac{\sum_{i=1}^n Y_i X_i}{\sum_{i=1}^n X_i^2}$

2. More information needs to be provided before we can know whether a more broad-based or a more specialized education increases the likelihood of getting called up for an interview.

You would need to know whether one photo is better looking than the other and whether physical attractiveness influences hiring decisions before you can conclude how the breadth of education affects likelihood of getting called up for an interview.

3. If the test scores for those made to attend 10 hours of school per day are, on average, the highest, then the test scores for those made to attend 4 hours of school per day would be the lowest.
4. At the 10% significance level, there is no evidence that the test scores of students made to attend 4 hours of school each day and the test scores of students made those made to attend 10 hours of school each day differ in the population.
5. Yes
6. the OLS estimator $\hat{\beta}_0$ is now an unbiased estimator of $\beta_0 + 27$
7. None of the options are true
8. A decrease in the incoming academic scores by 20 points is associated with a 0.01208 point increase in grade point average. The negative association between incoming academic scores and grade point average is statistically significant at the 6% level.
9. None of the options are correct.

Corona's incoming score (24) is much lower than the lowest incoming score (51.12) in this sample. As such, one should not use the regression line and extrapolate to make predictions of gpa for values of incoming score that are much lower than 51.12, because such predictions would be unreliable.

10. (-0.000733, -0.000475)

11. -0.003624

12. Teck Hua's grade point average is predicted to be 2.47 points lower.

13. -0.206 points

14. (0.0141, 0.0184)

15. The coefficient would be 0.0162. The standard error would be 0.00101

16. 0.00142

17. None of the options are correct

18.

. regress household_income male, robust

Linear regression	Number of obs	=	8,000
	F(1, 7998)	=	241.67
	Prob > F	=	0.0000
	R-squared	=	0.0245
	Root MSE	=	1010.3

household_~e	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
male	-342.2905	22.01844	-15.55	0.000	-385.4524	-299.1286
_cons	3289.723	14.75381	222.97	0.000	3260.802	3318.645

At the 5% significance level, there is evidence that monthly household incomes are on average lower for male students than for female students.

19.

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. regress household_income minor, robust
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Linear regression               Number of obs   =      8,000
                                F(1, 7998)       =       7.47
                                Prob > F          =     0.0063
                                R-squared         =     0.0010
                                Root MSE      =    1022.4
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household_~e	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
minor	97.52983	35.68919	2.73	0.006	27.56971	167.4899
_cons	3166.173	12.14004	260.80	0.000	3142.376	3189.971

At the 0.01% significance level, there is no evidence that household incomes differ on average between students who graduated with a minor and students who graduated without a minor.

20.

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. reg household_income gpa, robust
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Linear regression               Number of obs   =      8,000
                                F(1, 7998)       =    563.49
                                Prob > F          =     0.0000
                                R-squared         =     0.0789
                                Root MSE      =     981.76
```

household_~e	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
gpa	486.4702	20.49331	23.74	0.000	446.298	526.6424
_cons	1385.969	73.49976	18.86	0.000	1241.891	1530.048

At the 5% significance level, there is evidence that students with higher grade point average scores have higher monthly household incomes.