

Exam No. 2 on Topics from Chapters 2 & 3 (1 hour)

The Registrar's Office at UCSD has the data for 427 first year undergraduate students on the GPA in college (COLGPA, the dependent variable), GPA in high school (HSGPA), Verbal SAT scores (VSAT), and math SAT scores (MSAT). Three alternative models were estimated and the results are in the following table. Values in parentheses are standard errors. Model A used HSGPA for X, Model B used VSAT, and Model C used MSAT.

Variables	Model A	Model B	Model C
\hat{a}) Constant	0.921 (0.204)	1.997 (0.141)	1.628 (0.151)
\hat{b}) HSGPA	0.524 (0.057)		
\hat{b}) VSAT	0.00157 (0.00028)		
\hat{b}) MSAT	0.0020 (0.00026)		
ESS	103.994	115.837	109.180
TSS	124.599	124.599	124.599

- (6 points) In a regression model of the type specified in Assumption 3.1, indicate two things that the goodness of fit (R^2) measures.
- (10 points) For each model, compute the goodness of fit measure. Do the values indicate a good fit or not? Which model is the "best" and why?

You want to test Model A only for the overall goodness of fit.

- (4 points) State the null and alternative hypotheses.
- (6 points) Compute the test statistic and state its distribution under the null, including the numerical value(s) of the degrees of freedom (d.f.).
- (6 points) Now actually carry out the test. What is your conclusion?
- (12 points) For Model A only, test whether each of the regression coefficients is zero or not (use 1 percent level of significance). Be sure to state the null and alternative hypotheses, the test statistic and its distribution, including the d.f., the critical value (or range) and the criterion for rejection. Are the coefficients significantly different from zero or not?
- (6 points) Suggest a more general *multiple regression model* that is likely to be better than all of the above models. Explain "better" in what sense.

