Ph.D. Econometrics I
Heinz School, Carnegie Mellon University
90-906, Spring 2005

Final

Instructions You may use any books, notes, calculators, and other aids you like. You may not converse, nor may you cooperate.

Please complete all questions.

Please show all relevant work.

Please interpret your results in plain English.

Use the backs of pages if you need more space.

Each question is worth 33%. 1% for putting your name on the paper.

1. Please consider the SAS program and output you were provided. In that program, I use the "gallup" data described on the class website (codebook and description are attached to the SAS output).

   (a) What is the effect (and 95% CI) of aging one year on wages?

   (b) What are you assuming in the previous part?

   (c) Interpret the coefficient on Tech.

   (d) Test the hypothesis that neither technical education nor training affect wages.

   (e) How many years of experience is a training program "worth" — interpreting age as the effect of experience? 95% CI?

   (f) What is the difference (95% CI) in wages between a person with a HS degree and a person with college or more?

2. Consider a dataset tracking consumer spending. Let Y be total spending and let E_d, E_n, E_s be spending on durables, non-durables, and services: note $Y = E_d + E_n + E_s$. Consider the following three regression models:

$$\begin{aligned} E_d &= \beta_1 + \alpha_1 Y + \epsilon_1 \\ E_n &= \beta_2 + \alpha_2 Y + \epsilon_2 \\ E_s &= \beta_3 + \alpha_3 Y + \epsilon_3 \end{aligned}$$

   Prove that the sum of the $\hat{\beta}_{\text{OLS}}$s is zero and the sum of the $\hat{\alpha}_{\text{OLS}}$s is 1.

3. Consider the following dataset:

$$Y = \begin{bmatrix} 2 \\ -1 \\ -4 \\ 6 \\ -1 \\ -1 \\ -1 \end{bmatrix} \qquad X = \begin{bmatrix} 0 \\ -1 \\ -3 \\ 3 \\ 2 \\ -2 \\ 1 \end{bmatrix}$$

   Consider a regression model with Y as a LHS var and X as a RHS var.

   (a) What are the OLS estimates of the intercept and slope?

   (b) Usual estimate of the variance of the slope?

   (c) Test for non-linearity.

   (d) Use the Goldfeld Quandt test for heteroskedasticity (omit one data point).