Economics 472

Problem Set #5

(1) Stock and Watson, 4.1 parts (c) and (d).

Note: for part (d), you are asked to calculate the p-value associated with the two-sided test that the coefficient on *class size* equals zero. To do this, first calculate the value of the test statistic. The p-value is the probability that the standard Normal random variable (a good approximation to the sampling distribution of the standardized estimator with 100 observations) will exceed the *absolute* value of the test statistic. We discussed how this can be done in examples earlier in the semester. You will need to use Table 1 to perform these calculations. [Ideally, you would perform these calculations using the Student-t tables, but these are not presented in your book. Thus, you must use the Normal approximation]

(2) Stock and Watson, 4.2 part (c).

(3) Stock and Watson (5.3)

(4) Stock and Watson (5.4). *Hint:* When constructing the expected difference between the women, note that the difference will be of the form:

$$\Delta \equiv E(Wage|Betsy) - E(Wage|Sally) = 4\beta_{Age},$$

where β_{Age} is the coefficient on the age variable. Your estimate of this difference is then

$$\hat{\Delta} = 4\hat{\beta}_{Age}.$$

When constructing a confidence interval for Δ, first note that $\hat{\beta}_{Age}$ is a Normal random variable, and therefore $\hat{\Delta}$ is also a Normal random variable. Your 95 percent confidence interval will then be of the form:

$$\hat{\Delta} \pm 1.96\text{Std Dev}(\hat{\Delta}).$$

The Standard deviation can be calculated by first deriving the variance. Note:

$$\text{Var}(\hat{\Delta}) = \text{Var}[4\hat{\beta}_{Age}] = 16\text{Var}(\hat{\beta}_{Age}).$$

Recommendation: I would also try exercise 5.1. To determine the level of significance, you will first need to calculate the t-statistics associated with the hypothesis that the coefficient equals zero. If the t-stat exceeds the critical value at the given level of significance, then the coefficient is said to be significant at that level.