Answers to Exam No. 1 on Topics from Chapters 2 through 8

I.

1. $s_t^2 = a_1 + a_2\, pop_t + a_3\, pop_t^2$.

2. The null hypothesis is $a_2 = a_3 = 0$.

3. The test statistic is LM = 51 $\times$0.119 = 6.069.

4. Under the null, LM is distributed as Chi-square with 2 d.f.

5. For a 5 percent level, the critical LM^* = 5.99146. Because LM > LM^*, we reject the null hypothesis and conclude that there is significant HSK.

6. Using the auxiliary regression, estimate the residual variance as

$$\hat{s}_t^2 = -1.37791 + 1.37239\, pop_t - 0.04124\, pop_t^2$$

Next compute $w_t = 1/\sqrt{\hat{s}_t^2}$. Finally, regress ($w_t$ EXPTRAV$_t$) against w_t and (w_t INCOME$_t$), with no constant term.

II.

$S_t = a + b\,A_t + u_t$ and $s_t^2 = s^2/N_t$. Let $w_t = 1/\sqrt{1/N_t} = \sqrt{N_t}$. Next regress $w_t\,S_t$ against w_tS_t, and w_tA_t, without a constant term. Because we are using known weights, OLS estimators are unbiased, consistent, most efficient, and BLUE. Also all tests of hypotheses are valid.