Answers to Exam No. 2 on Topics from Chapters 2 through 4

1..
The null hypothesis for overall significance is that the regression coefficients for HOME, INST, SVC, TV, AGE, AIR, and Y are all zero, that is, $b_i = 0$ for i = 2-8. The alternative is that at least one of them is not zero.

2..
The test statistic is given by Equation (4.4) and has the value

$$F_c = \frac{(43865.001 - 4923.914)/7}{4923.914/(40-8)} = 36.15$$

3.
Under the null hypothesis, F_c has the F-distribution with d.f. 7 and 32.

4.
The critical F *(0.01) is between 3.12 and 3.30 which is less than F_c. The null hypothesis is therefore rejected.

5-7.
For individual coefficients, we carry out a t-test. The critical $t^*_{32}(0.05)$ is between 1.684 and 1.697. If the computed t_c is above this (numerically) we reject the null hypothesis that the corresponding regression coefficient is zero and conclude that the variable has a significant effect on the number of subscribers to cable TV. The following table gives the computed t_c and the criterion.

	Coefficient	**Std. Error**	**Test statistic**	**Signif./Insign.**
$\hat{b}_1$	−6.808	26.7	Ignore	Ignore
$\hat{b}_2$	0.406	0.035	11.600	Significant
$\hat{b}_3$	−0.526	0.476	−1.105	Insignificant
$\hat{b}_4$	2.039	2.127	0.959	Insignificant
$\hat{b}_5$	0.757	0.688	1.100	Insignificant
$\hat{b}_6$	1.194	0.502	2.374	Significant
$\hat{b}_7$	−5.111	1.518	−3.367	Significant
$\hat{b}_8$	0.0017	0.00347	0.490	Insignificant

8..
The variables INST, SVC, TV, and Y are candidates to be excluded because the corresponding coefficients are not statistically significant.

9. $H_0 : b_i = 0$ for i = 3, 4 ,5, and 8. H_1: At least one of them is not zero.

10. $F_c = \dfrac{(5595.615 - 4923.914)/4}{4923.914/(40-8)} = 1.09$

11. Under H_0, F_c has the *F*-distribution with d.f. 4 and 32.

12..
For a 10 percent test, *F* * is between 2.09 and 2.14. Because $F_c < F^*$, we cannot reject the null hypothesis. Thus the omitted variables have coefficients that are jointly insignificant.