**Question 1:** (a) Correct.

(b) Correct.

(c) Correct.

**Question 2:** Correct.

**Question 3:** Correct.

**Question 4:** The denominator of RSE formula seems to be wrong, which should be n-2.

**Question 5:** (a) Correct.

(b) Correct.

(c) Correct, by mentioning the F test, I actually mean it will give us a p value.

**Question 6:** Explanations are correct, but the violated assumption seems to be wrong. The answer says that it violated the assumption that samples are independent and identically distributed, I thought that it may violate the assumption of homogeneity of variance.

**Question 7:** (a) My answer is not good for the question. The answer said that in linear mixed effects models, Z is a categorical variable with any arbitrary values and v is assumed to be random. But in simple linear regression using a control variable, we assume that the regression coefficients for the control variable is not random but meaningful in relationship to the response variable. Also the value of the regressor itself is meaningful in the data.

(b) My answer is not good for the question. The linear mixed effects objective function includes the covariance matrix of the random effect term itself and adds an additional penalty for low values of v. By contrast, the linear regression objective function only attempts to minimize the mean squred error.

(c) My answer is too general. Linear mixed effect models allow us to account for predictor variables that are not of primary interest and result from random selection, but may still impact the response variable itself.

**Applied:**

**Question 8:** (a)Correct

(b) The model is correct, but I didn’t show diagnostic plots for the linear regression fit.

(c) Incorrect: I included the random effect of Herd, but I didn’t include a random slope for the factor of size. But still, after including the random effect of Herb, the effect of herd size gets stronger.

(d) Correct.

**Question 9:** (a) Correct.

(b) Correct.

(c) Correct.

(d) Correct.

(e) Incorrect. I think I included all interactive terms for factors that showed significant main effect. I should look at the correlation matrix first.

(f) Correct, I added a quadratic term for displacement.

**Question 10:** (a) Correct.

(b) Correct, it would be better if I interpreted further the impact of price, which has a negative relationship with sales.

(c) Incorrect, I missed the term of urban

(d) Correct

(e) Correct

(f) I used anova to compare the two models.

(g) Correct

(h) Correct

**Question 11:** (a) Correct

(b) Correct, I actually caculated sqrt(0.25)=0.5

(c) Correct

(d) Correct

(e) Correct

(f) Correct but not perfect, I forgot to add legand

(g) Correct

(h) Correct

(i) Correct (I increased the sd from 0.01 in h to 0.1)

(j) Correct, because in (h) the sd is 0.1, which is less than 0.5 in the original model, so the fit’s interval of (i) is narrower than the first fit’s, but still larger than the second fit’s interval.