Chapter 11

Note: wherever possible, values used in the solutions below are taken directly from the SAS output provided in the text.

1. a $WGT = \beta_0 + \beta_1 HGT + \beta_2 AGE + \beta_3 (AGE)^2 + E$

b Since we are interested in the relationship between HGT and WGT, we will focus on $\hat{\beta}_1$ as the measure of association. The following table is useful to assess potential confounding due to AGE and/or AGE^2:

Independent Variables In Model	$\hat{\beta}_1$	95 % CI for β_1
HGT, AGE, AGE^2	0.72	(0.097, 1.350)
HGT, AGE	0.72	(0.141, 1.303)
HGT, AGE^2	0.73	(0.139, 1.313)
HGT	1.07	(0.540, 1.604)

Note that $\hat{\beta}_1$ does not change when either AGE or AGE^2 are removed from the model. However, $\hat{\beta}_1$ changes "significantly" when both AGE and AGE^2 are removed from the model. Thus, there is confounding due to AGE and AGE^2.

c AGE^2 can be dropped from the model because $\hat{\beta}_1$ does not change significantly.

d AGE^2 should not be retained in the model because the 95% C.I. for β_1 is narrower when AGE^2 is absent from the model.

e Considering the change in $\hat{\beta}_1$ and the width of the 95% C.I., the final model should be $WGT = \beta_0 + \beta_1 HGT + \beta_2 AGE + E$.

f Revise the model as $WGT = \beta_0 + \beta_1 HGT + \beta_2 AGE + \beta_3 (AGE)^2 + \beta_4 HGT*AGE + \beta_5 HGT*(AGE)^2 + E$.

g We would test for interaction by performing a multiple-partial F test for H_0: $\beta_4 = \beta_5 = 0$. If this test is significant, then perform separate partial F tests to assess H_0: $\beta_4 = 0$ and H_0: $\beta_5 = 0$.