Chapter 13

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

1. a $SBP = \beta_0 + \beta_1 QUET + \beta_2 SMK + E$

b For smokers: $SBP = (\beta_0 + \beta_2) + \beta_1 QUET + E$

$\overline{SBP(adj)} = (63.876 + 8.571) + (22.116)(3.441) = 148.548$

For nonsmokers: $SBP = \beta_0 + \beta_1 QUET + E$

$\overline{SBP(adj)} = 63.876 + (22.116)(3.441) = 139.977$

	Adjusted	Unadjusted
Smokers	148.548	147.823
Nonsmokers	139.977	140.800

The difference in adjusted means is slightly larger than the difference in unadjusted means.

c $H_0 : \beta_2 = 0 \quad H_A : \beta_2 \neq 0$ in the model $SBP = \beta_0 + \beta_1 QUET + \beta_2 SMK + E$

Test statistic: $T = 2.707$

T follows a t distribution with 29 degrees of freedom (df) under H_0.

P- value: $P = 2\Pr(T \geq 2.707) = 0.011$

At $\alpha = 0.05$ we reject H_0 and conclude that mean SBP is different for smokers and nonsmokers after adjusting for QUET.

d Finding the 95 % confidence interval for the true difference in adjusted mean SBP is equivalent to finding the 95 % confidence interval for $\hat{\beta}_2$.

i.e. $\overline{SBP_{SMK}(adj)} - \overline{SBP_{NON}(adj)} = 8.571 = \hat{\beta}_2$

The 95 % confidence interval for $\hat{\beta}_2$ equals:

$\hat{\beta}_2 \pm t_{29,0.975} \cdot S_{\hat{\beta}_2} = 8.571 \pm (2.045)(3.167) = (2.094, 15.048)$