Chapter 8

1. a i $\hat{Y} = 45.103 + 1.213(50) + 9.946(1) + 8.592(3.5) = 145.771$

ii $\hat{Y} = 45.103 + 1.213(50) + 9.946(0) + 8.592(3.5) = 135.825$

iii $\hat{Y} = 45.103 + 1.213(50) + 9.946(1) + 8.592(3.0) = 141.475$

As QUET increases from 3.0 to 3.5, average SBP increases by an estimated 4.296 points, from 141.475 to 145.771.

b $R^2 = \dfrac{\text{SSY - SSE}}{\text{SSY}}$

For SBP regressed on AGE: $R^2 = \dfrac{6425.969 - 2564.338}{6425.969} = 0.601$

For SBP regressed on AGE and SMK: $R^2 = \dfrac{6425.969 - 1736.285}{6425.969} = 0.730$

For SBP regressed on AGE, SMK, and QUET: $R^2 = \dfrac{6425.969 - 1536.143}{6425.969} = 0.761$

The model using AGE and SMK to predict SBP appears to be the best choice. The model explains almost as much variation in SBP as does the model containing all three of the predictors and does so with one less variable included in the model.

2. a $\hat{Y} = -0.0635 + 23.451(2.8) - 7.073(7.0) = 16.088$

A comparison of the values reveals that the estimate is not very close to the actual value obtained for patient 5 in the data (25 vs. 15.7).

b For Y on X_1: $R^2 = \dfrac{13791.170 - 12255.313}{13791.170} = 0.111$

For Y on X_2: $R^2 = \dfrac{13791.170 - 13633.323}{13791.170} = 0.011$

For Y on X_1 and X_2: $R^2 = \dfrac{13791.170 - 11037.299}{13791.170} = 0.200$

The model containing X_1 and X_2 appears to be the best model. While not the simplest model represented, it explains almost double the variation of the next best model, and represents the best model for predicting the outcome.