STAT 217: Quiz 25

1. In a study of soil properties, 50 soil samples were taken. We'll work with three variables: response calcium concentration (ppm), and predictors pH (low numbers are acidic, high numbers basic, 7 is neither) and elevation (m). Data for the first six soil samples are shown below.

```
lm.noelev <- lm(Ca~pH,data=soil)
summary(lm.noelev)


##
## Call:
## lm(formula = Ca ~ pH, data = soil)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.5469 -0.1573  0.0323  0.1531  0.7427
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)   -7.539      1.454   -5.18  4.3e-06
## pH             1.896      0.248    7.66  7.3e-10
##
## Residual standard error: 0.26 on 48 degrees of freedom
## Multiple R-squared:  0.55,Adjusted R-squared:  0.54
## F-statistic: 58.6 on 1 and 48 DF,  p-value: 7.33e-10


lm.soil <- lm(Ca~elev+pH,data=soil)
summary(lm.soil)


##
## Call:
## lm(formula = Ca ~ elev + pH, data = soil)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.4777 -0.1768  0.0019  0.1506  0.6466
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  95.1285    52.6080    1.81    0.077
## elev         -0.1760     0.0901   -1.95    0.057
## pH            1.7702     0.2492    7.10  5.7e-09
##
## Residual standard error: 0.253 on 47 degrees of freedom
## Multiple R-squared:  0.584,Adjusted R-squared:  0.566
## F-statistic: 32.9 on 2 and 47 DF,  p-value: 1.15e-09
```

(a) By how much does R^2 increase when you add elevation to the model?

(b) By how much does the adjusted R^2 increase when you add elevation to the model?

(c) Explain why R^2 increases more than adjusted R^2.

(d) If your goal was to predict calcium concentrations in soil, would you include elevation in your final model? Why or why not?