1. The following output is the first step in a stepwise selection process applied to the statedata data set from the faraway library to estimate Life Expectancy (in years) from a set of predictors. According to the following output and using the AIC criteria, the first variable to be removed from the model would be:

```
## Start:  AIC=-22.18
## Life.Exp ~ Population + Income + Illiteracy + Murder + HS.Grad +
##     Frost + Area
##
##                Df Sum of Sq    RSS     AIC
## - Area          1    0.0011 23.298 -24.182
## - Income        1    0.0044 23.302 -24.175
## - Illiteracy    1    0.0047 23.302 -24.174
## <none>                      23.297 -22.185
## - Population    1    1.7472 25.044 -20.569
## - Frost         1    1.8466 25.144 -20.371
## - HS.Grad       1    2.4413 25.738 -19.202
## - Murder        1   23.1411 46.438  10.305
##
```

( ) None (X) Area ( ) Muder ( ) Population

Justification: Area is the variable that if we remove it, it leads to a model with the lowest AIC .

2. Which of the following statement(s) can be true post adding a variable in a linear regression model?

   1. R-Squared and Adjusted R-squared both increase
   2. R-Squared increases and Adjusted R-squared decreases
   3. R-Squared decreases and Adjusted R-squared decreases
   4. R-Squared decreases and Adjusted R-squared increases

   (X) 1 and 2 ( ) 1 and 3 ( ) 2 and 4 ( ) None of the above

   Justification: When a variable is added in the model, the R-Squared always increases. The Adjusted R-squared might increase or decrease, depending on whether the variable is statistically significant or not.

3. Linear models with a high number of predictors tend to have higher bias and lower variance than models with a small number of predictors

   ( ) True (X) False

   Justification: This is not necessary to happen.

4. Variable selection can be applied to regression problems when the number of predicting variables is larger than the number of observations.

   (X) True ( ) False

Justification: We do variable selection when we want to reduce the bumber of variables in a model. It can also be used when the variables are more than the data .

5. AIC and BIC criteria always select the same model.

( ) True (X) False

Justification: Not necessarily. BIC is a stricter criterion compared to AIC.