**Exercise 6.8: Problems 2 & 3**

**2.**

**a.**

iv is correct. We know that Lasso reduces the number of variables, thus is less flexible than the OLS. But it can lasso reduces variance and increases bias, and in normal the reduction in variance will compensate increasement in bias. Thus, Lasso will improve the model.

**b.**

The same as a, because ridge regression is similar to Lasso, except every variable has a non-zero coefficient.

**c.**

ii is correct. Because non-linear method is more flexible to capture the feature of the data. Also it reduce bias and increase variance.

**3.**

**a.**

iv is correct. Because as we increase s, the λ will decrease to 0 and it will be a OLS model finally. And when we lift the restrictions on βj we will increase the flexibility of the model and training error will be continuing reduced.

**b.**

ii is correct, test RSS will decrease initially, and then eventually start increasing in a U shape. Because when s increasing, the model will be more flexible. At first, the decrease in bias will be larger than the increase in variance which leads to a decrease in test RSS. Then we may get the lowest RSS. And then, the model can become too flexible and the increase in variance becomes larger than the decrease in bias leading to overfit, and an increase in test RSS.

**c.**

iii is correct, because when we increase the flexibility of model, the variance will increase.

**d.**

iv is correct, because when we increase the flexibility of model, the bias will decrease.

**e.**

v is correct. By definition, the irreducible error is not captured by the model, being independent of s.