Question 2 Chap VI

For parts (a) through (c), indicate which of i. through iv. is correct.

Justify your answer.

(a) The lasso, relative to least squares, is:

i. More flexible and hence will give improved prediction accuracy when its increase in bias is less than its decrease in variance.
    - **Incorrect ; lasso is not more flexible than least squares; it is less flexible because coefficients are constrained.**
ii. More flexible and hence will give improved prediction accuracy when its increase in variance is less than its decrease in bias.
    - **Incorrect; again, assumes lasso is more flexible, which is false**.
iii. Less flexible and hence will give improved prediction accuracy when its increase in bias is less than its decrease in variance.
    - **Correct; lasso reduces variance at the cost of some bias; prediction improves if the variance reduction dominates.**
iv. Less flexible and hence will give improved prediction accuracy when its increase in variance is less than its decrease in bias.
    - **Incorrect; lasso does not increase variance, it reduces variance.**

(b) The ridge, regression relative to least squares.

i. More flexible and hence will give improved prediction accuracy when its increase in bias is less than its decrease in variance.
    a. **Incorrect ; ridge is not more flexible.**
ii. More flexible and hence will give improved prediction accuracy when its increase in variance is less than its decrease in bias.
    a. **Incorrect; ridge is less flexible.**
iii. Less flexible and hence will give improved prediction accuracy when its increase in bias is less than its decrease in variance.
    a. **Correct; lasso reduces variance at the cost of some bias; prediction improves if the variance reduction dominates.**
iv. Less flexible and hence will give improved prediction accuracy when its increase in variance is less than its decrease in bias.
    a. **Incorrect; ridge reduces variance, not increases**

(c) The non-linear methods, relative to least squares

i. More flexible and hence will give improved prediction accuracy when its increase in bias is less than its decrease in variance.
    - **Incorrect ; nonlinear methods decrease bias, not increase it.**

ii. More flexible and hence will give improved prediction accuracy when its increase in variance is less than its decrease in bias.
    - **Correct; improved prediction occurs when bias reduction is larger than variance increase.**
iii. Less flexible and hence will give improved prediction accuracy when its increase in bias is less than its decrease in variance.
    - **Incorrect; nonlinear models are more flexible**.
iv. Less flexible and hence will give improved prediction accuracy when its increase in variance is less than its decrease in bias.
    - **Incorrect ; again, assumes less flexible**.