

ISLR | Chapter 6 Exercises

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Conceptual

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- **A.** For a model with k predictors, Best Subset Selection will always have the best *training* RSS. The reason for this is, given a fixed k , there are $\binom{p}{k}$ possible models, and Best Subset Selection considers all of those $\binom{p}{k}$ possibilities.

In Forward Subset Selection, of the total $\binom{p}{k}$ possible models, only the models that contain the $k - 1$ model produced by Forward Subset Selection will be considered for the “best” k predictor model.

In Backward Subset Selection, of the total $\binom{p}{k}$ possible models, the predictors in the “best” k variable model *must* be a subset of the model with $k + 1$ predictors.

In short, Best Subset Selection will have the best *training* RSS for a model with k predictors because it considers **all** the possible $\binom{p}{k}$ models, whereas Forward and Backward Subset Selection only consider a **subset** of all the possible $\binom{p}{k}$ models.