**1. Do you get the same optimal parameters with each method?**

**Direct Fitting:** This approach provides a single set of parameters based on the entire dataset. It does not inherently offer insights into the optimality of parameters beyond the specific dataset it was trained on.

**K-fold Cross-Validation:** By partitioning the data into K different subsets and using each in turn for validation while training on the remainder, cross-validation provides a more generalized set of parameters. These parameters are averaged over multiple runs, potentially leading to a more robust and generalizable set of optimal parameters compared to the direct fitting method.

**Bootstrapping:** This method involves sampling the original dataset with replacement to create many "bootstrap" datasets. Fitting the model to each of these datasets provides a distribution of parameters. The mean of these parameters could be considered as "optimal" in a way that accounts for the variability in the dataset.

Given these different approaches, the "optimal" parameters obtained from each method are likely to differ. The direct fitting method optimizes parameters for the specific dataset. In contrast, K-fold cross-validation and bootstrapping provide parameters that are, on average, more generalizable and robust to changes in the data. However, the degree of difference depends on the dataset's characteristics and the complexity of the model.

**2. Which method(s) tend to give you higher bias and lower variance and vice versa?**

**Direct Fitting:** Tends to have low bias because it fits the model directly to the training data. However, it might exhibit high variance when applied to new data because it might overfit to the training data, especially if the dataset is small or not representative of the broader population.

**K-fold Cross-Validation:** Aims to reduce variance by averaging the results over multiple splits of the dataset. It might introduce a slight increase in bias since the model is never trained on the full dataset at once, but this trade-off often results in a model that generalizes better to new data.

**Bootstrapping:** Primarily addresses variance by providing a sense of how stable the model's predictions are across different samples of the dataset. It can slightly increase the bias if the bootstrapped datasets diverge significantly from the original dataset, but like K-fold cross-validation, this method helps in understanding how the model might perform on different subsets of data, thus potentially leading to a more robust model.

In summary, direct fitting might lead to higher variance, whereas K-fold cross-validation and bootstrapping are techniques designed to achieve a better balance between bias and variance, often resulting in models that generalize better but might have a slightly higher bias in exchange for significantly reduced variance.