1. What is Bias in ML models?
2. What is Variance in ML models?
3. What is the trade-off between bias and variance?
4. What are the demerits of a high bias / high variance ML model?
5. How do you select the model (high bias or high variance) based on the training data size?

## ****c) Detailed Article:****

* [Understanding the Bias-Variance Tradeoff and visualizing it with example and python code](https://towardsdatascience.com/understanding-the-bias-variance-tradeoff-and-visualizing-it-with-example-and-python-code-7af2681a10a7)

<https://towardsdatascience.com/understanding-the-bias-variance-tradeoff-and-visualizing-it-with-example-and-python-code-7af2681a10a7>

## b) Example Questions:

1. What is imbalanced data in classification?
2. Is accuracy a good performance metric? When does it fail to capture the performance of an ML system?
3. What are Precision and Recall? Give an example
4. How to address the issue of imbalanced data?

## c) Detailed Articles:

* [A walk through imbalanced classes in machine learning through a visual cheat sheet](https://towardsdatascience.com/a-walk-through-imbalanced-classes-in-machine-learning-through-a-visual-cheat-sheet-974740b19094)

## b) Example Questions:

1. What is Bayes’ theorem?
2. Toy example to implement Bayes’ theorem
3. What is the difference between MLE and MAP?
4. When are MAP and MLE equal?

## c) Detailed Articles:

* [A Gentle Introduction to Bayes Theorem for Machine Learning](https://machinelearningmastery.com/bayes-theorem-for-machine-learning/)

## b) Example Questions:

1. What is Principal Component Analysis?
2. How can we use PCA to reduce dimensions?
3. What do the eigenvalues signify in the context of PCA? (Greater the magnitude of eigenvalue, the more information is preserved if we keep that corresponding eigenvector as a feature vector for our data)

## c) Detailed Articles:

* [Understanding Principle Component Analysis(PCA) step by step.](https://medium.com/analytics-vidhya/understanding-principle-component-analysis-pca-step-by-step-e7a4bb4031d9)

## b) Example Questions:

1. What is Regression in ML?
2. How can we introduce regularization in regression? (LASSO and Ridge)
3. What impact does LASSO and Ridge regression has on the weights of the model? (Ridge tries to reduce the size of the weights learned, whereas LASSO tries to force them to zero creating a more sparse set of weights)
4. When does the prediction by Bayesian linear regression approach the prediction of linear regression? (When the number of data points is large enough)
5. Is logistic regression a misnomer? (Yes, because it is not regression, but classification based on regression)

## c) Detailed Articles:

* [5 Types of Regression and their properties](https://towardsdatascience.com/5-types-of-regression-and-their-properties-c5e1fa12d55e)
* [Introduction to Bayesian Linear Regression](https://towardsdatascience.com/introduction-to-bayesian-linear-regression-e66e60791ea7)

## b) Example Questions:

1. What is regularization in ML?
2. How can we address over-fitting?
3. What is K-fold cross-validation?
4. What is the difference between L1 and L2 regularization?
5. Why do we use dropout?

## c) Detailed Articles:

* [Regularization](https://ml-cheatsheet.readthedocs.io/en/latest/regularization.html)
* [Regularization in Machine Learning](https://towardsdatascience.com/regularization-in-machine-learning-76441ddcf99a)

## b) Example Questions:

1. What is CNN?
2. Explain the difference between the convolutional layer and transposed convolutional layer.
3. What are some of the loss functions used for classification?

## c) Detailed Article:

* [What is a Convolutional Neural Network?](https://towardsdatascience.com/a-visualization-of-the-basic-elements-of-a-convolutional-neural-network-75fea30cd78d?source=friends_link&sk=680f483949434299ba538a3e0674a40a)

## b) Example Questions:

1. How does the ResNet network address the problem of vanishing gradient?
2. What is one of the main key features of the Inception Network?
3. What are shortcut connections in the ResNet network?

## c) Detailed Articles:

* [Difference between AlexNet, VGGNet, ResNet, and Inception](https://towardsdatascience.com/the-w3h-of-alexnet-vggnet-resnet-and-inception-7baaaecccc96)

## b) Example Questions:

1. What is Ensemble learning?
2. What is bagging, boosting, and stacking in ML?
3. What is the difference between bagging and boosting?
4. Name a few boosting methods

## c) Detailed Articles:

* [Ensemble methods: bagging, boosting, and stacking](https://towardsdatascience.com/ensemble-methods-bagging-boosting-and-stacking-c9214a10a205)
* [What are Ensemble methods in machine learning?](https://towardsdatascience.com/what-are-ensemble-methods-in-machine-learning-cac1d17ed349)