Assignment 2.

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Q-1.
The estimation parametes are
* Class probabilities
* Mean
* Variance.
These values changes with grayscale images because they have one brightness value per pixel, whereas RGB has 3 per pixel.

Q -2
The accuracy of QDA is worse with RGB (36.23%) when compared to grayscale images (44.28%).

QDA has to estimate different shapes for each class, which is hard with more features (RGB has 3072) because it can lead to overfitting and less reliable estimates. With fewer features (1024 for grayscale), it's easier for QDA to learn and perform better.

Q-3
This occurs because Grayscale images lose color information, which might help the models distinguish between classes. With fewer features, the models may not have enough information to make accurate predictions.

Q-4 Gaussian Naive Bayes:

- RGB: A lot of parameters because it has to estimate means and variances for 3072 features.
- Grayscale: Fewer parameters because it only estimates for 1024 features.

LDA:

- RGB: Estimates mean values for 3072 features and has a shared covariance matrix.
- Grayscale: Estimates for 1024 features, leading to fewer parameters.

QDA:

- RGB: Estimates means for 3072 features and a different covariance matrix for each class, leading to many parameters.
- Grayscale: Estimates for 1024 features, which reduces the number of parameters.