1.
```
> summary(wine_pca)
Importance of components:
                          PC1    PC2     PC3     PC4     PC5     PC6     PC7    PC8     PC9    PC10
Standard deviation     2.0155 1.5246 0.93259 0.90205 0.78790 0.70172 0.52275 0.5059 0.41915 0.33450
Proportion of Variance 0.4062 0.2324 0.08697 0.08137 0.06208 0.04924 0.02733 0.0256 0.01757 0.01119
Cumulative Proportion  0.4062 0.6387 0.72563 0.80700 0.86908 0.91832 0.94565 0.9712 0.98881 1.00000
```

2.
```
> loadings_pc1
            Flavanoids             Total phenols Od280/od315 of diluted wines
Hue
             0.4555529              0.4234687              0.4166142              0.3392301
   Nonflavanoid Phenols                Proline             Malic acid              Magnesium
             0.3215373              0.2968863              0.2774631              0.1482252
               Alcohol        Color Intensity
             0.1387659              0.1214953
```

The value that contributes the most is Flavanoids

3.
```
> print(svm_conf_matrix)
Confusion Matrix and Statistics

          Reference
Prediction  1  2  3
         1 17  0  0
         2  0 21  0
         3  0  0 14

Overall Statistics

               Accuracy : 1
                 95% CI : (0.9315, 1)
    No Information Rate : 0.4038
    P-Value [Acc > NIR] : < 2.2e-16

                  Kappa : 1

 Mcnemar's Test P-Value : NA

Statistics by Class:

                     Class: 1 Class: 2 Class: 3
Sensitivity            1.0000   1.0000   1.0000
Specificity            1.0000   1.0000   1.0000
Pos Pred Value         1.0000   1.0000   1.0000
Neg Pred Value         1.0000   1.0000   1.0000
Prevalence             0.3269   0.4038   0.2692
Detection Rate         0.3269   0.4038   0.2692
Detection Prevalence   0.3269   0.4038   0.2692
```

Balanced Accuracy 1.0000 1.0000 1.0000

4.
> print(svm_conf_matrix)
Confusion Matrix and Statistics

Reference
Prediction 1 2 3
1 16 1 0
2 1 20 0
3 0 0 14

Overall Statistics

Accuracy : 0.9615
95% CI : (0.8679, 0.9953)
No Information Rate : 0.4038
P-Value [Acc > NIR] : < 2.2e-16

Kappa : 0.9415

Mcnemar's Test P-Value : NA

Statistics by Class:

Class: 1 Class: 2 Class: 3
Sensitivity 0.9412 0.9524 1.0000
Specificity 0.9714 0.9677 1.0000
Pos Pred Value 0.9412 0.9524 1.0000
Neg Pred Value 0.9714 0.9677 1.0000
Prevalence 0.3269 0.4038 0.2692
Detection Rate 0.3077 0.3846 0.2692
Detection Prevalence 0.3269 0.4038 0.2692
Balanced Accuracy 0.9563 0.9601 1.0000

5.
> print(svm_conf_matrix)
Confusion Matrix and Statistics

Reference
Prediction 1 2 3
1 16 2 0
2 1 19 1
3 0 0 13

Overall Statistics

Accuracy : 0.9231
95% CI : (0.8146, 0.9786)
No Information Rate : 0.4038
P-Value [Acc > NIR] : 4.536e-15

Kappa : 0.8828

Mcnemar's Test P-Value : NA

Statistics by Class:

	Class: 1	Class: 2	Class: 3
Sensitivity	0.9412	0.9048	0.9286
Specificity	0.9429	0.9355	1.0000
Pos Pred Value	0.8889	0.9048	1.0000
Neg Pred Value	0.9706	0.9355	0.9744
Prevalence	0.3269	0.4038	0.2692
Detection Rate	0.3077	0.3654	0.2500
Detection Prevalence	0.3462	0.4038	0.2500
Balanced Accuracy	0.9420	0.9201	0.9643

6.

```
> # Display contingency tables for each model
> cat("Contingency Tables:\n")
Contingency Tables:
> cat("Original 13 Attributes Model:\n")
Original 13 Attributes Model:
> print(conf_matrix_orig$table)
          Reference
Prediction  1  2  3
         1 17  0  0
         2  0 21  0
         3  0  0 14
> cat("\nFirst 3 PCs Model:\n")

First 3 PCs Model:
> print(conf_matrix_pca$table)
          Reference
Prediction  1  2  3
         1 16  1  0
         2  1 20  0
         3  0  0 14
> cat("\nReduced Dataset's First 3 PCs Model:\n")

Reduced Dataset's First 3 PCs Model:
> print(conf_matrix_reduced$table)
          Reference
Prediction  1  2  3
         1 16  2  0
         2  1 19  1
         3  0  0 13
> # Display the comparison of metrics
> cat("\nComparison of Precision, Recall, and F1 Scores:\n")

Comparison of Precision, Recall, and F1 Scores:
> print(comparison)
                      Model Precision    Recall        F1
1       Original 13 Attributes 1.0000000 1.0000000 1.0000000
```

2 First 3 PCs 0.9645191 0.9645191 0.9645191
3 Reduced Dataset's First 3 PCs 0.9312169 0.9248366 0.9273369