EXPERIMENT NO 4

CODE :

```
## Supervised Learning (Classification) – SVM
# Load necessary libraries
library(caret)
library(e1071)

# Load dataset
data(iris)

# Split dataset into train and test (70% train, 30% test)
set.seed(123)
train_index <- createDataPartition(iris$Species, p=0.7, list=FALSE)
train_data <- iris[train_index,]
test_data <- iris[-train_index,]

# Train SVM model and predict
model <- svm(Species ~ ., data=train_data)
predictions <- predict(model, test_data)

# Confusion Matrix
conf_matrix <- confusionMatrix(predictions, test_data$Species)
print(conf_matrix)
```

Confusion Matrix and Statistics

		Reference	
Prediction	*setosa*	*versicolor*	*virginica*
setosa	*15*	*0*	*0*
versicolor	*0*	*14*	*2*
virginica	*0*	*1*	*13*

Overall Statistics

Accuracy : 0.9333

95% CI : (0.8173, 0.986)

No Information Rate : 0.3333

P-Value [Acc > NIR] : < 2.2e-16

Kappa : 0.9

Mcnemar's Test P-Value : NA

Statistics by Class:

	Class: setosa	*Class: versicolor*	*Class: virginica*
Sensitivity	*1.0000*	*0.9333*	*0.8667*
Specificity	*1.0000*	*0.9333*	*0.9667*
Pos Pred Value	*1.0000*	*0.8750*	*0.9286*
Neg Pred Value	*1.0000*	*0.9655*	*0.9355*
Prevalence	*0.3333*	*0.3333*	*0.3333*
Detection Rate	*0.3333*	*0.3111*	*0.2889*
Detection Prevalence	*0.3333*	*0.3556*	*0.3111*
Balanced Accuracy	*1.0000*	*0.9333*	*0.9167*

#Unsupervised Learning (Clustering) - K-Means

```
# Load necessary libraries
library(cluster)
library(factoextra)
# K-means clustering
set.seed(123)
kmeans_model <- kmeans(iris[, -5], centers=3)
# Silhouette Score
sil_score <- silhouette(kmeans_model$cluster, dist(iris[, -5]))
avg_sil_width <- mean(sil_score[, 3])
print(paste("Average Silhouette Score:", round(avg_sil_width, 3)))
# Visualizing Clusters
fviz_cluster(kmeans_model, data=iris[, -5])
```