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Time taken	14 mins 59 secs
Grade	8.67 out of 10.00 (86.67%)

Question 1

Complete

Mark 1.00 out of 1.00

Two classes are linearly separable when.....

- ☐ a. A hypersurface separates both classes perfectly with no classification errors.
- ☐ b. A line separates both classes perfectly with no classification errors.
- ☒ c. A hyperplane separates both classes perfectly with no classification errors.

Question 2

Complete

Mark 1.00 out of 1.00

Consider the following covariance matrices.

a) `cov_matrix = matrix(c(2,1.5,1.5,2), nrow=2)`

b) `cov_matrix = matrix(c(2,-1.5,-1.5,2), nrow=2)`

How is the correlation between variables in each case?

- ☐ a. Correlation is negative for a) and positive for b)
- ☒ b. Correlation is positive for a) and negative for b)
- ☐ c. Correlation is positive in both cases

Question 3

Complete

Mark -0.33 out of 1.00

Inspect the following code:

```
# covariance matrix for both classes
cov_matrix = matrix(c(2,1.5,1.5,2), nrow=2)

# generate data from negative class
class_neg <- rmvnorm(n=200, mean=mean_neg, sigma=diag(2)) %>%
  as_tibble() %>%
  mutate(y=-1) %>%
  rename(x1=V1, x2=V2)
```

How is the distribution of the random vectors?

- ☐ a. Spherical, variance is the same in all directions
- ☒ b. The data cloud is tilted because the covariance matrix is not diagonal.
- ☐ c. The data cloud is not gaussian

Question 4

Complete

Mark 1.00 out of 1.00

Consider the following R code

```
rmvnorm(n=X, mean=mean_neg, sigma=diag(Y))
```

Provide values to generate 2 random vectors in 3 dimensions.

- ☐ a. X=3, Y=2
- ☐ b. X=1/3, Y=1
- ☒ c. X=2, Y=3

Question 5

Complete

Mark 1.00 out of 1.00

Consider the following correlation matrices

a) $\text{cov_matrix_neg} = \text{matrix}(c(1, .9, .9, 1), \text{nrow}=2)$

b) $\text{cov_matrix_pos} = \text{matrix}(c(1, -.9, -.9, 1), \text{nrow}=2)$

c) $\text{cov_matrix_pos} = \text{matrix}(c(1, 0, 0, 1), \text{nrow}=2)$

which one has no correlation?

- ☐ a. b
- ☐ b. a
- ☒ c. c

Question 6

Complete

Mark 1.00 out of 1.00

In the data distribution illustrated by the Boston Cream, the classifier based on the nearest centroid provides bad results because.....

- ☒ a. The mean of both classes is the same
- ☐ b. There are not enough neighbours to correctly classify the test points.
- ☐ c. The variance of both classes is different.

Question 7

Complete

Mark 1.00 out of 1.00

In this data distribution, the variables are:



- ☒ a. Correlation is positive
- ☐ b. Correlation is negative
- ☐ c. They are not correlated

Question 8

Complete

Mark 1.00 out of 1.00

In a two class problem with 100 data points per class, how many euclidean distances should be calculated in the Nearest Centroid Classifier and in a k_NN classifier with k=5 for a new test point?

- ☐ a. 200 for the NCC and 5 for the 5-NN classifier
- ☐ b. 2 for the NCC and 5 for the 5_NN classifier
- ☒ c. 2 for the NCC and 200 for the 5_NN classifier.

Question 9

Complete

Mark 1.00 out of 1.00

In the skewed point clouds case the NCC does not provide good results. Why?

- ☒ a. Because the optimal decision boundary is not perpendicular to the line that joins both centroids.
- ☐ b. Because the classes overlap
- ☐ c. Because the features are correlated for both classes.

Question 10

Complete

Mark 1.00 out of 1.00

The Nearest Centroid Classifier for a two class problem in 10 dimensions needs to estimate how many scalars in the training data?

- ☒ a. 20
- ☐ b. 2
- ☐ c. 10