ECE 50024

Homework 1

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## Exercise 1:

Icon

Description automatically generated

A picture containing chart

Description automatically generated

Chart

Description automatically generated

Mean of the distribution is: 0.026005414594233493.

Standard Deviation of the distribution is: 0.9907009680534483.

A picture containing diagram

Description automatically generated

Chart, histogram

Description automatically generated

Text, letter

Description automatically generated

A picture containing shape

Description automatically generated

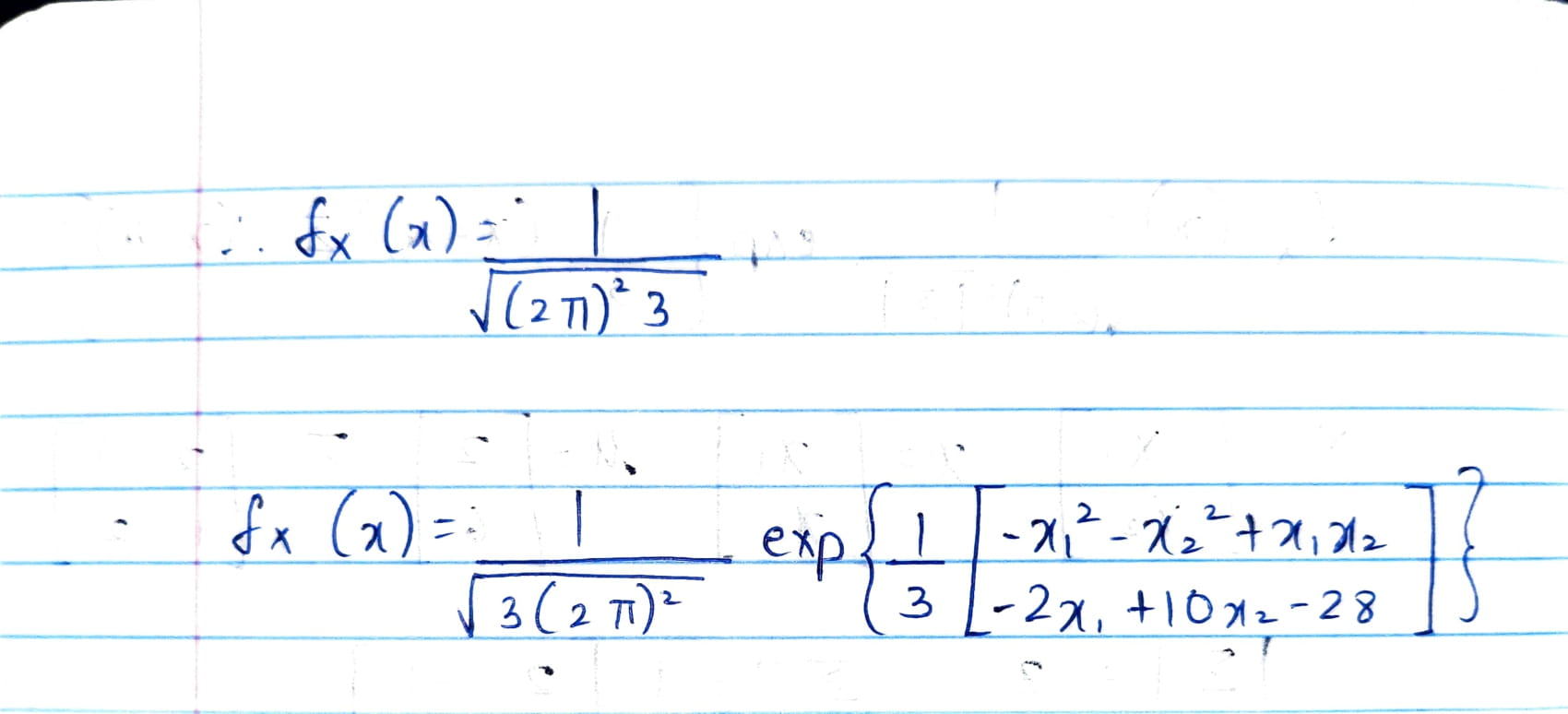
Optimal number of bins = 15

Chart, histogram

Description automatically generated

## Exercise 2:

## Text, letter Description automatically generated



## b)

Text, letter

Description automatically generated

A piece of paper with writing

Description automatically generated with medium confidenceText, letter

Description automatically generatedA piece of paper with writing

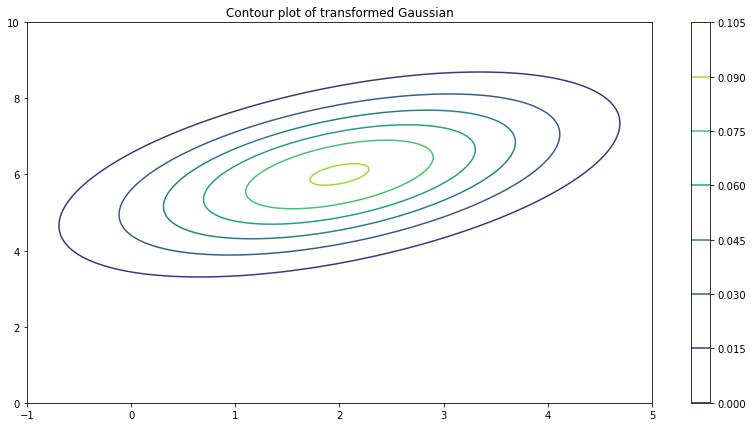
Description automatically generated with medium confidenceDiagram, letter

Description automatically generatedText, letter

Description automatically generatedA picture containing text, document

Description automatically generated

## c)



Chart, scatter chart

Description automatically generated

Chart, scatter chart

Description automatically generated

The results from parts (c)(i) and (ii) are in line with the theoritical findings. The plot of (c)(ii) represents a 2D transformed gaussian quite effectively. Similarly, the A matrix calculated from the transformed samples matches with its hand-calculated counterpart.

## Exercise 3:

## Scatter plot of data

Chart, scatter chart

Description automatically generated

Text, letter

Description automatically generated

Letter

Description automatically generated

Text, letter

Description automatically generated

## Least squares solution

Chart, line chart

Description automatically generated

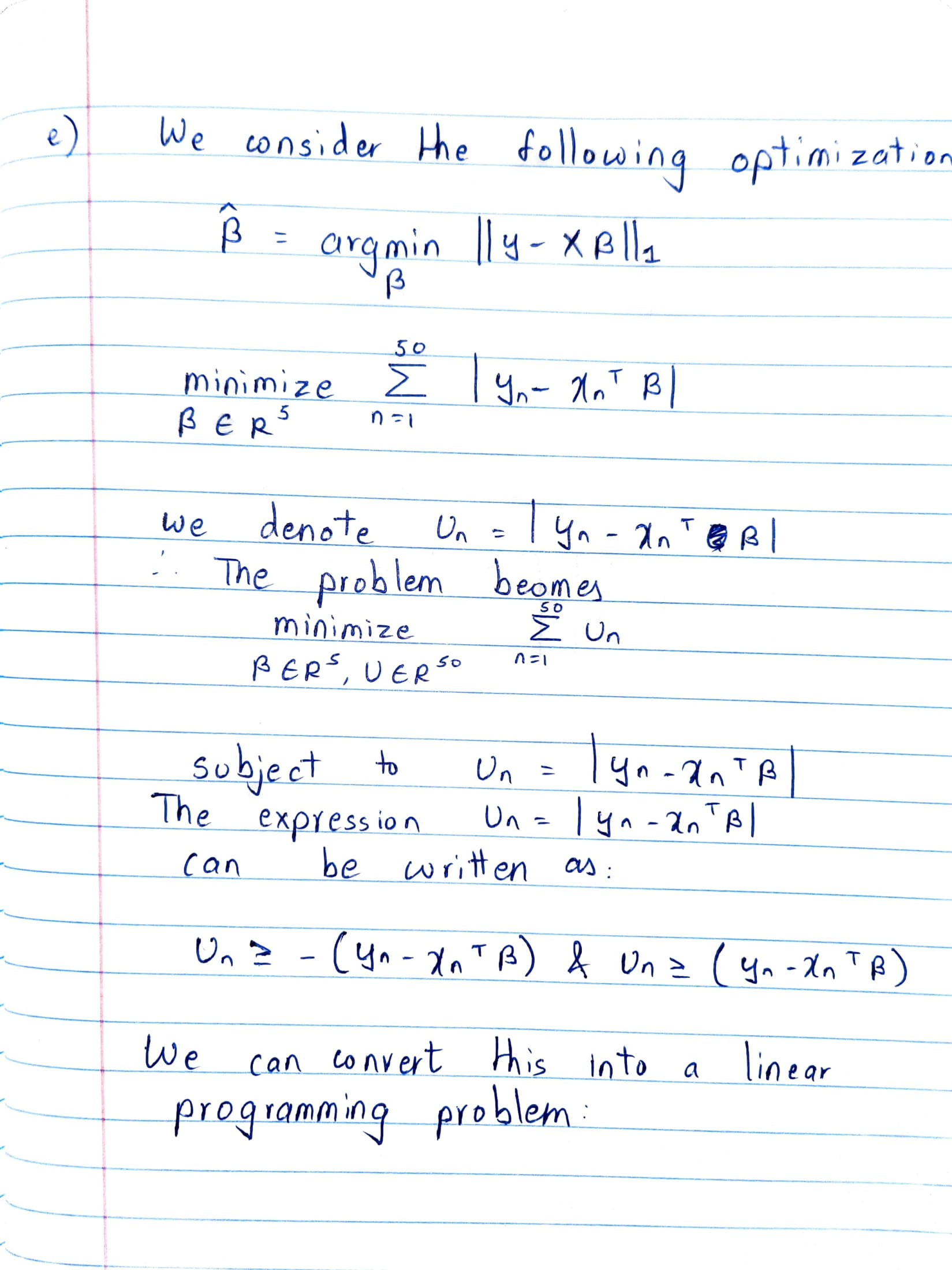
## Presence of Outliers

Chart

Description automatically generated

Observation: The existence of outliers has severely impacted the performance of Least Square regression. The fitted curve has experienced a positive offset, and no longer is representative of the data.

## Linear Programming Problem



Text, letter

Description automatically generated

A picture containing diagram

Description automatically generated

Chart, line chart

Description automatically generated

# APPENDIX