MTH – 522: Advanced Mathematical Statistics

Homework 2

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Hat Matrix

1. In the toy data example:

Graphical user interface

Description automatically generated with low confidence

1. What is the hat matrix?

Solution:

Scatter chart

Description automatically generated with medium confidence

1. Verify that hat matrix is symmetric and idempotent.

Solution:

Graphical user interface, text, application

Description automatically generated

Table

Description automatically generated

Text

Description automatically generated with low confidence

Table

Description automatically generated

1. Verify that the diagonal elements of the hat matrix are in the range of [0,1].

Solution.

Graphical user interface, text, application

Description automatically generated

Table

Description automatically generated with medium confidence

1. What is the trace of diagonal elements?

Solution.

Graphical user interface, text, application

Description automatically generated

A picture containing text

Description automatically generated

The trace of the hat matrix should be equal to p.

We see that the trace is equal to 2 for this example, which is true as p = 2 for this example.

1. Verify the following property of matrix trace

trace(AB)=trace(BA)

Solution.

Text

Description automatically generated

Text

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