# EE5609 Assignment 17

Abhishek Thakur

***Abstract*—This document solves problem based on Matrix Theory.**

Download all solutions from

https://github.com/abhishekt711/EE5609/tree/master/Assignment_17

## 1 Problem

Usig the result of Exercise 8 to proove that , If $A$ and $B$ are $n \times n$ matrices over the field $F$, then $AB$ and $BA$ have precisely the same characteristic values.

## 2 solution

| | |
|---|---|
| Given | $A$ and $B$ are $n \times n$ matrices over the field $F$. |
| To prove | $AB$ and $BA$ have precisely the same characteristic values. |
| Proof | Let suppose $c$ is the characteristic value of $AB$.<br>Then, $\lvert cI - AB\rvert = 0$<br><br>Here, $I$, $A$ and $B$ are $n \times n$ matrix.<br>$\implies c^n \lvert I - \frac{1}{c}AB\rvert = 0$<br>Using the result of Exercise 8,<br>$c^n \lvert I - \frac{1}{c}BA\rvert = 0$<br><br>$\implies \lvert cI - BA\rvert = 0$<br><br>$AB$ and $BA$ have precisely the same characteristic value. |