Assignment 3

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Download all python codes from

https://github.com/neharani289/ee14014/Assignment3/codes

and latex-tikz codes from

https://github.com/neharani289/ee14014/Assignment3

0.1 Problem

(Section 3.10) 18(ii).

$$\begin{vmatrix} y+k & y & y \\ y & y+k & y \\ y & y & xy+k \end{vmatrix} = k^2(3y+k) \tag{0.1.1}$$

0.2 Solution

Given determinant:

$$\Delta = \begin{vmatrix} y+k & y & y \\ y & y+k & y \\ y & y & xy+k \end{vmatrix} \tag{0.2.1}$$

Applying transformation:

$$\xleftrightarrow{R_1 \leftarrow R_1+R_2+R_3} \begin{vmatrix} 3y+k & 3y+k & 3y+k \\ y & y+k & y \\ y & y & y+k \end{vmatrix} \tag{0.2.2}$$

$$\xleftrightarrow{C_2 \leftarrow C_2-C_1} \begin{vmatrix} 3y+k & 0 & 3y+k \\ y & k & y \\ y & 0 & y+k \end{vmatrix} \tag{0.2.3}$$

$$\xleftrightarrow{C_3 \leftarrow C_3-C_1} \begin{vmatrix} 3y+k & 0 & 0 \\ y & k & 0 \\ y & 0 & k \end{vmatrix} \tag{0.2.4}$$

Taking deteminant

$$\implies \Delta = (3y+k)k^2 \tag{0.2.5}$$

$$\begin{vmatrix} y+k & y & y \\ y & y+k & y \\ y & y & xy+k \end{vmatrix} = k^2(3y+k) \tag{0.2.6}$$

Hence proved.