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).

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

0.2 Solution

Given determinant:

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

Applying transformation:

$$\stackrel{R_1 \leftarrow R_1 + R_2 + R_3}{\longleftrightarrow} \begin{vmatrix} 3y + k & 3y + k & 3y + k \\ y & y + k & y \\ y & y & y + k \end{vmatrix}$$
(0.2.2)

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

$$\stackrel{C_3 \leftarrow C_3 - C_1}{\longleftrightarrow} \begin{vmatrix} 3y + k & 0 & 0 \\ y & k & 0 \\ y & 0 & k \end{vmatrix}$$
(0.2.4)

Taking determinant

$$\implies \Delta = (3y + k)k^2 \qquad (0.2.5)$$

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

Hence proved.