

# EE5609: Matrix Theory

## Assignment 13

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Download codes from

[https://github.com/Atul\\_191/EE5609/Assignment13](https://github.com/Atul_191/EE5609/Assignment13)

### 1 QUESTION

Which of the following matrices has the same row space as the matrix  $\begin{pmatrix} 4 & 8 & 4 \\ 3 & 6 & 1 \\ 2 & 4 & 0 \end{pmatrix}$ ?

- 1)  $\begin{pmatrix} 1 & 2 & 0 \\ 0 & 0 & 1 \end{pmatrix}$
- 2)  $\begin{pmatrix} 1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$
- 3)  $\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$
- 4)  $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$

### 2 SOLUTION

Statement	Solution
Given Matrix	$\begin{pmatrix} 4 & 8 & 4 \\ 3 & 6 & 1 \\ 2 & 4 & 0 \end{pmatrix}$ (2.0.1)
Definition	For Vector Space; it allows any addition or multiplication of vectors so that the result remains in space

Solution	<p>Refer(2.0.1), we proceed to have a Row Reduced Echelon Form</p> $\begin{pmatrix} 4 & 8 & 4 \\ 3 & 6 & 1 \\ 2 & 4 & 0 \end{pmatrix} \xleftrightarrow[R_1 \leftarrow \frac{R_1}{2}]{R_1 \leftarrow R_3} \begin{pmatrix} 1 & 2 & 0 \\ 3 & 6 & 1 \\ 4 & 8 & 4 \end{pmatrix} \quad (2.0.2)$ $= \begin{pmatrix} 1 & 2 & 0 \\ 3 & 6 & 1 \\ 4 & 8 & 4 \end{pmatrix} \xleftrightarrow[R_2 \leftarrow R_2 - 3R_1]{R_3 \leftarrow \frac{R_3}{4}} \begin{pmatrix} 1 & 2 & 0 \\ 0 & 0 & -2 \\ 1 & 2 & 1 \end{pmatrix} \quad (2.0.3)$ $= \begin{pmatrix} 1 & 2 & 0 \\ 0 & 0 & -2 \\ 1 & 2 & 1 \end{pmatrix} \xleftrightarrow[R_2 \leftarrow R_3]{R_3 \leftarrow R_3 - R_1} \begin{pmatrix} 1 & 2 & 0 \\ 0 & 0 & 1 \\ 0 & 0 & -2 \end{pmatrix} \quad (2.0.4)$ $= \begin{pmatrix} 1 & 2 & 0 \\ 0 & 0 & 1 \\ 0 & 0 & -2 \end{pmatrix} \xleftrightarrow{R_3 \leftarrow R_3 + 2R_2} \begin{pmatrix} 1 & 2 & 0 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{pmatrix} \quad (2.0.5)$
Correct Answer	So we conclude that Option 1 is correct

Table1:Solution