Step-1

We have to construct a 3 by 3 matrix whose column space contains $(1,1,0)$ and $(1,0,1)$ but not $(1,1,1)$.

If $A=\begin{bmatrix}1&1&0\\1&0&0\\0&1&0\end{bmatrix}$

If possible $\begin{bmatrix}1\\1\\1\end{bmatrix}=c_1\begin{bmatrix}1\\1\\0\end{bmatrix}+c_2\begin{bmatrix}1\\0\\1\end{bmatrix}+c_3\begin{bmatrix}0\\0\\0\end{bmatrix}$

$\Rightarrow c_1+c_2=1,\ c_1=1,\ c_2=1$

Step-2

If $c_1=1, c_2=1$ then $c_1+c_2=2$

Therefore the also equations has not solution

Therefore $\begin{bmatrix}1\\1\\1\end{bmatrix}$ is not linear combination of the columns of A

Therefore Column space A does not contain $\begin{bmatrix}1\\1\\1\end{bmatrix}$.

Hence the required matrix is $\boxed{A=\begin{bmatrix}1&1&0\\1&0&0\\0&1&0\end{bmatrix}}$

Step-3

We have to construct a 3 by 3 matrix whose column space is only a line.

If $B=\begin{bmatrix}1&3&0\\2&6&0\\4&12&0\end{bmatrix}$

Let $\begin{bmatrix} b_1 \\ b_2 \\ b_3 \end{bmatrix} \in \mathbf{C}(B)$

Then

$$\begin{bmatrix} b_1 \\ b_2 \\ b_3 \end{bmatrix} = c_1 \begin{bmatrix} 1 \\ 2 \\ 4 \end{bmatrix} + c_2 \begin{bmatrix} 3 \\ 6 \\ 12 \end{bmatrix}$$
$$= (c_1 + 3c_2) \begin{bmatrix} 1 \\ 2 \\ 4 \end{bmatrix}$$

Step-4

Therefore

$$(b_1, b_2, b_3) = \{(c_1 + 3c_2)\,(1,2,4) / c_1, c_2 \in \mathbf{R}^2\}$$
$$= \{x(1,2,4) / x \in \mathbf{R}\}$$

Therefore the column space of B is only one line that containing the vector $(1,2,4)$.

Hence the required matrix whose column so\pace is only a line is $\boxed{B = \begin{bmatrix} 1 & 3 & 0 \\ 2 & 6 & 0 \\ 4 & 12 & 0 \end{bmatrix}}$.