

1. true
2. true
3. false
4. true
5.  $\alpha |x\rangle + \beta |y\rangle + \gamma |z\rangle = 0$  ; has infinitely many solution
6. to set all vectors that can be constructed using linear combination of  $\{|x\rangle, |y\rangle, |z\rangle\}$
7. true
8. the span of 3 linearly independent vectors is a vector space with dimension of 3
9. linearly independent
10.  $3 \begin{pmatrix} 1 \\ 2 \end{pmatrix} = \begin{pmatrix} 3 \\ 6 \end{pmatrix}$   
Linearly Independent
11.  $\begin{pmatrix} 3 \\ -4 \end{pmatrix} = \begin{pmatrix} 7 \\ 1 \end{pmatrix}$   
Linearly Independent
12. true
13. false
14. true
15.  $\begin{pmatrix} 1 & 4 \\ 0 & 5 \end{pmatrix} \begin{pmatrix} 1 \\ 1 \end{pmatrix}$   
 $= \begin{pmatrix} 1+4 \\ 0+5 \end{pmatrix}$   
 $= \begin{pmatrix} 5 \\ 5 \end{pmatrix}$   
 $\lambda = 5$
16.  $\begin{pmatrix} 7 & 0 \\ -3 & 4 \end{pmatrix} \begin{pmatrix} -1 \\ 1 \end{pmatrix}$   
 $= \begin{pmatrix} -7+0 \\ 3+4 \end{pmatrix}$   
 $= \begin{pmatrix} -7 \\ 7 \end{pmatrix}$   
 $\lambda = 7$
17.  $\begin{pmatrix} 7 & -1 \\ 2 & 4 \end{pmatrix} \begin{pmatrix} \frac{1}{2} \\ 1 \end{pmatrix}$   
 $= \begin{pmatrix} \frac{7}{2}-1 \\ 1+4 \end{pmatrix}$   
 $= \begin{pmatrix} \frac{5}{2} \\ 5 \end{pmatrix}$   
 $\lambda = 5$

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