Math 2418 Linear Algebra Quiz #7
Oct. 24-25, 2001

Circle T for True and F for false.

[2] 1.) $Span\{\begin{bmatrix} 4 \\ 1 \end{bmatrix}, \begin{bmatrix} 2 \\ 3 \end{bmatrix}, \begin{bmatrix} 7 \\ 5 \end{bmatrix}\} = R^2$. T

The vectors are not multiples of each other, thus they span something at least 2-dimensional. Since they live in R^2, they span something at most 2-dimensional. Since the only 2-dimensional plane in R^2 is R^2, $Span\{\begin{bmatrix} 4 \\ 1 \end{bmatrix}, \begin{bmatrix} 2 \\ 3 \end{bmatrix}, \begin{bmatrix} 7 \\ 5 \end{bmatrix}\} = R^2$.

[2] 2.) $\{\begin{bmatrix} 4 \\ 1 \end{bmatrix}, \begin{bmatrix} 2 \\ 3 \end{bmatrix}, \begin{bmatrix} 7 \\ 5 \end{bmatrix}\}$ is linearly independent. F

3 vectors in a 2-dimensional space cannot be linearly independent.

[2] 3.) $\{\begin{bmatrix} 4 \\ 1 \end{bmatrix}, \begin{bmatrix} 2 \\ 3 \end{bmatrix}, \begin{bmatrix} 7 \\ 5 \end{bmatrix}\}$ is a basis for R^2. F

Since they are not linearly independent, they are not a basis.

[2] 4.) $Span\{\begin{bmatrix} -2 \\ -3 \end{bmatrix}, \begin{bmatrix} 4 \\ 6 \end{bmatrix}, \begin{bmatrix} 0 \\ 0 \end{bmatrix}\} = R^2$. F

The last two vectors are multiples of the first. Thus they span a (1-dimensional) line going through the origin and (-2, -3) [and (4, 6)].

[2] 5.) $\{\begin{bmatrix}-2\\-3\end{bmatrix}, \begin{bmatrix}4\\6\end{bmatrix}, \begin{bmatrix}0\\0\end{bmatrix}\}$ is linearly independent. F

3 vectors in a 2-dimensional space cannot be linearly independent.

Since at least one of the vectors is a linear combination of the other vectors (since its a multiple of one of the vectors), they are not linearly independent.

[2] 6.) $\{\begin{bmatrix}-2\\-3\end{bmatrix}, \begin{bmatrix}4\\6\end{bmatrix}, \begin{bmatrix}0\\0\end{bmatrix}\}$ is a basis for R^2. F

Since they are not linearly independent, they are not a basis.

Since they don't span all of R^2, they are not a basis for R^2.

[2] 7.) $Span\{7 + 4t,\ 2 - 3t\} = \mathbf{P_1}$ = the set of all polynomials of degree at most 1. T

The vectors are not multiples of each other, thus they span something at least 2-dimensional. Since they live in $\mathbf{P_1}$, they span something at most 2-dimensional. Since the only 2-dimensional subspace in $\mathbf{P_1}$ is $\mathbf{P_1}$, $Span\{7 + 4t,\ 2 - 3t\} = \mathbf{P_1}$

[2] 8.) $Span\{3 + t,\ 5 - 2t\} = Span\{1 - t,\ 4 + 2t\}$. T

Since they both span a 2-dimensional subspace of $\mathbf{P_1}$ and the only 2-dimensional subspace in $\mathbf{P_1}$ is $\mathbf{P_1}$, $Span\{3 + t,\ 5 - 2t\} = \mathbf{P_1} = Span\{1 - t,\ 4 + 2t\}$.

[2] 9.) $\{3 + 2t^2,\ 4 - t,\ 5 - 2t + t^2\}$ is a basis for $Span\{7 - t + 2t^2,\ 9 - 3t + t^2\}$. F

3 vectors cannot be a basis for a 2-dimensional subspace. Either, they are not linearly independent or they span a larger 3-dimensional space.

[2] 10.) $Span\{7 - t + 2t^2,\ 9 - 3t + t^2\} = Span\{2 - 2t - t^2,\ 16 - 4t + 3t^2\}$. T

By looking carefully at these spaces, you can determine that they span the same space since the vectors in each set is a linear combination of the vectors in the other set.

[2] 11.) $Span\{7 - t + 2t^2,\ 9 - 3t + t^2\} = Span\{2 - 2t - t^2,\ 16 - 4t + 2t^2\}$. F

By looking carefully at these spaces, you can determine that they do NOT span the same space since at least one of the vectors in each set is NOT a linear combination of the vectors in the other set.