span whole space? If not, what? l.i.? If not, what's redundant?

$$\begin{bmatrix}1\\0\end{bmatrix}$$

$$\begin{bmatrix}1\\0\end{bmatrix} \quad \begin{bmatrix}0\\1\end{bmatrix} \quad \begin{bmatrix}1\\1\end{bmatrix}$$

$$\begin{bmatrix}1\\2\\3\end{bmatrix} \quad \begin{bmatrix}4\\5\\6\end{bmatrix} \quad \begin{bmatrix}7\\8\\9\end{bmatrix}$$

$$\begin{bmatrix}1\\0\\0\end{bmatrix} \quad \begin{bmatrix}2\\0\\0\end{bmatrix} \quad \begin{bmatrix}0\\1\\0\end{bmatrix}$$

 

Evelyn Boyd Granville

Image 1 Credit: http://www.visionaryproject.org/granvilleevelyn/
Image 2 Credit: Marge Murray. Courtesy of Evelyn Boyd Granville

...this was the most interesting job of my lifetime—to be a member of a group responsible for writing computer programs to track the paths of vehicles in space

Reduce and write sols in vector parametrization form (for any k that give consistency) and discuss the geometry

$$\begin{bmatrix} 1 & k & 0 \\ k & 1 & 0 \end{bmatrix} \xrightarrow{r_2' = ?r_1 + r_2} \begin{bmatrix} 1 & k & 0 \\ ? & ? & ? \end{bmatrix} =$$

 

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$$\begin{bmatrix} 1 & k & 0 \\ k & 1 & 0 \end{bmatrix} \xrightarrow{r_2' = ?r_1 + r_2} \begin{bmatrix} 1 & k & 0 \\ ? & ? & ? \end{bmatrix} = \begin{bmatrix} 1 & k & 0 \\ 0 & -k^2+1 & 0 \end{bmatrix}$$

If $-k^2 + 1$ is nonzero then $\vec{x} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$.

If $-k^2 + 1 = 0$ then $k = \pm 1$ and ∞ solutions.

When k=1 we have $\vec{x} = t \begin{bmatrix} -1 \\ 1 \end{bmatrix}$. When k=-1 we have $\vec{x} = t \begin{bmatrix} 1 \\ 1 \end{bmatrix}$.

1.1, 1.2, 1.4 and 1.5

- Gaussian, Gauss-Jordan/ReducedRowEchelonForm, pivots
- alg & geom of sols of eqs; augmented matrix rows intersecting in 0 [no concurrent], 1 [point], or ∞ [$x_2\vec{v}_1 + \vec{v}_2$ line parallel to $\vec{v}_1$ thru tip $\vec{v}_2$, plane, hyperplane...]
- homogeneous system always consistent, so 1 or ∞ sols, underdetermined system 0 or ∞ sols

1.3, 1.4 and 1.7

- alg & geom of vectors; columns of matrix: diagonal of parallelogram, scaling along vector, on the same line or plane and the parametrized equations and geom of those
- linear combinations and weights; mixing problems
- span, l.i.