# Homework 21, Section 4.3: 3, 4, 7, 10, 15, 25

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## Homework

### 3.

This set does not form a basis for $R^3$. The set is linearly dependent and does not span $R^3$

### 4.

The determinant equals 1, so these vectors are linearly independent. These vectors form a basis for $R^3$.

### 7.

This set does not form a basis for $R^3$ because it is linearly independent and $m \geq n$.

### 10.

The RREF is $\begin{bmatrix} 1 & 0 & 0 & 2 & 3 & 0 \\ 0 & 1 & 0 & -1 & -2 & 0 \\ 0 & 0 & 1 & 0 & -2 & 0 \end{bmatrix}$. The span is then $\begin{bmatrix} -2 \\ 1 \\ 0 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} -3 \\ 2 \\ 2 \\ 0 \\ 1 \end{bmatrix}$

### 15.

The RREF is $\begin{bmatrix} 1 & 0 & 2 & 2 & 3 \\ 0 & 1 & -2 & -1 & -1 \\ -2 & 2 & -8 & 10 & -6 \\ 3 & 3 & 0 & 3 & 9 \end{bmatrix}$. This reduces to

$\begin{bmatrix} 1 & 0 & 2 & 2 & 3 \\ 0 & 1 & -2 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$

### 25.

Yes it is a basis a typical element in H is $sv1 + (t - s)v2 + sv3$.
we can re-write this as $s(v1 + v3) + (t - s)(v2), so\{v1 + v3, v2\}$ is a basis for H.

the problem is that the span of {v1,v2,v3} is much bigger than H, it is all of $R^3$. This means that just because it is linearly independent, it is not the basis for H. Since the basis of the subspace is not isomorphic to R or $R^2$, it's too big for the span.