Recitation 2

September 3

Problem 1.

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

Problem 2. The following two matrices are the augmented matrices of two systems of equations. Find the general solutions of the systems of equations corresponding to the matrices.

- $x_1 = 4 + 5x_3$, $x_2 = 5 + 6x_3$ and x_3 is a free variable.
- x_1 is free, $x_2 = 21$ and $x_3 = 8$

Problem 3. $x = -9, y = -5$.

Problem 4. Span of v_1 and v_2 as a set is just all possible linear combinations $x_1v_1 + x_2v_2$ of v_1 and v_2. So, to figure out if a vector b is in the span, one needs to determine of there are constants x_1, x_2 such that $x_1v_1 + x_2v_2 = b$. So the question boils down to determining if a system of equations has a solution. As a result, b is in the span, c is not, and d is in the span only if $x = -1/2$.

Problem 5. Yes, it can. Using row reduction we see that the corresponding system of equations always has solutions, for any right hand side. So geometrically, span of the columns of B is $\mathbb{R}^3$.

Problem 6. No, two vectors in $\mathbb{R}^3$ can never span $\mathbb{R}^3$.

Problem 7. The property implies that v_1 and v_2 are multiples of each other, so geometrically their span is just a line.