

### Term Test Ba version 2

(1) [5 points] Solve the following system of linear equations.

$$\begin{array}{rcrcrcrcl} 4x & - & y & = & -8 \\ -2x & + & \frac{1}{2}y & = & 4 \end{array}$$

Provide the solution set in the following form (if your solution is unique, then  $p = 0, q = 0$ ):

$$\left\{ \begin{pmatrix} x \\ y \end{pmatrix} \in \mathbb{R}^2 \mid \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} m \\ n \end{pmatrix} + s \begin{pmatrix} p \\ q \end{pmatrix} \right\}$$

(2) [5 points] Consider the vector space of 2x2 matrices. Are the following four matrices a basis for this vector space?

$$A = \begin{bmatrix} 8 & -10 \\ -3 & -9 \end{bmatrix}, B = \begin{bmatrix} -5 & 0 \\ -4 & 1 \end{bmatrix}, C = \begin{bmatrix} 2 & -1 \\ -7 & -16 \end{bmatrix}, D = \begin{bmatrix} 1 & -9 \\ 0 & 8 \end{bmatrix}$$

- If yes, find the coordinates in terms of this basis for

$$E = \begin{bmatrix} 4 & -9 \\ -3 & 7 \end{bmatrix}$$

- If no, express one of the four given matrices by the other three.

(3) [5 points] Consider the following three vectors in  $\mathbb{R}^3$ ,

$$\begin{pmatrix} -8 \\ -10 \\ 2 \end{pmatrix}, \begin{pmatrix} 0 \\ -1 \\ -3 \end{pmatrix}, \begin{pmatrix} -2 \\ 6 \\ 5 \end{pmatrix}$$

Determine the three lengths of these vectors and the three angles between them in degrees (not radians). If they replace the origin to the points  $P, Q, R$ , determine the plane equation for the plane containing the three points, using the cross product.