Example (3.3-27)

Determine whether the following vectors form a basis of R^4

(1,1,1,1), (1,-1,1,-1),(1,2,4,8),(1,-2,4,-8)

Exercise 1.2-30
Find the polynomial of degree 3 whose graph passes through the points (0,1),(1,0),(-1,0), (2,-15)

$$-2x^3 - x^2 + 2x + 1$$

Find the inverse of the rotation matrix.

$$\begin{vmatrix} \cos(a) & -\sin(a) \\ \sin(a) & \cos(a) \end{vmatrix}$$

Let T be a clockwise rotation in R^2 by $\pi/2$ followed by an orthogonal projection onto the y axis.

1. Find the matrix of T.
2. Determine whether T is invertible
3. Find im(T) and ker(T

Find the inverse of the matrix. Interpret your result geometrically.

$$\begin{vmatrix} a & b \\ b & -a \end{vmatrix}$$

For the matrix A below, find all the 2x2 matrices X that satisfy the equation $A.X=I_2$.

$$\begin{vmatrix} 1 & 2 \\ 3 & 5 \end{vmatrix}$$

3.1-23 Describe the image and kernel of the reflexion about the line y=x/3 in R^2. Compute the dimensions of the kernel and the image.

(2.4-31)For which values of the constants a, b and c is the following matrix invertible?

$$\begin{vmatrix} 0 & a & b \\ -a & 0 & c \\ -b & -c & 0 \end{vmatrix}$$

3.2-46 Find a basis of the kernel and image of the matrix.
Determine the dimensions of the kernel and image.
Determine the rank.
Justify your answers.

$$\begin{vmatrix} 1 & 2 & 0 & 3 & 5 \\ 0 & 0 & 1 & 4 & 6 \end{vmatrix}$$

Example (3.3-31)

Let V be the subspace of R^4 defined by the equation $x_1 - x_2 + 2x_3 + 4x_4 = 0$

Find a linear transformation T from R to R^4 such that ker(T)={0}, im(T)=V.

Describe T by its matrix.

Give an example of a 5 x 4 matrix A with dim(ker A)=3. Compute dim(im A).

Consider the vectors of R^5, (1,1,0,0,0), (0,0,0,2,2), (1,1,0,1,1), (0,0,1,0,0).

Compute the dimension of the subspace V of R spanned by those vectors.

Are they linearly independent?

Is (1,2,0,0,0) a linear combination of those vectors?