1. Let

$$\begin{array}{rcl} x+3y+3z & = & 1 \\ x+(a+4)\,y+\left(-a^2+4a-1\right)z & = & 4 \\ -2x-6y+\left(a^2-4a-2\right)z & = & a-4 \end{array}$$

be a linear equations system. Determine for which values of a:
There is one solution
There is an infinite number of solutions
There is no solution
If there is a for which there are infinite solutions- choose such a and find the general form of the solutions.

2. For the following matrix A:

$$A=\begin{pmatrix} 2 & -1 & 0 \\ 1 & 1 & -1 \\ -2 & 4 & -2 \end{pmatrix}$$

find a basis for $R(A)$
find a basis for $C(A)$
express $C(A)$ as a set of solutions of linear equation system.
detemine if A is invertible. If so, find A^{-1}.

3. For $A=\begin{pmatrix} 1 & 3 & -6 \\ 4 & 2 & -8 \\ 3 & 3 & -8 \end{pmatrix}$ find an invertible matrix P and a diagonal matrix D such that

$$P^{-1}AP=D$$

4. She'ela Meytiva:

(a) Compute the projection $\pi_w(v)$ for $v=\begin{pmatrix} 1 \\ 2 \\ -1 \\ 3 \end{pmatrix}$, $w=\begin{pmatrix} -2 \\ \frac{1}{2} \\ 2 \\ 3 \end{pmatrix}$.

(b) Compute the angle between $v=\begin{pmatrix} 2 \\ 3 \\ -1 \\ 2 \end{pmatrix}$ and $w=\begin{pmatrix} -2 \\ -1 \\ 3 \\ 3 \end{pmatrix}$

(c) Let

$$B=\begin{pmatrix} 1 & 0 & 0 \\ 0 & 2 & 3 \\ 0 & 3 & 5 \end{pmatrix}$$

compute the inverse of B^2.