EE 204 - Homework 2: Linear Algebra I
Due Date: March 14, 2017 (15:00)

Homework

1) Write a C program that contains and calls the Func-1 and Func-2 functions below. This program also
- ask the dimension of the **square** A matrix,
- ask the elements of the A matrix one by one.
- Shows the output(outputs) of each function

Func-1) Write a C **function(DECMPS)** which can decompose the A matrix (square matrix) into a diagonal component D, and the remainder R as the given matrix equations below. Arguments of this function are
- A matrix →input
- Dimension of the A matrix → input
- D matrix→ output
- R matrix → output

$$A = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{bmatrix}$$

$$A = D + R \quad \text{where} \quad D = \begin{bmatrix} a_{11} & 0 & \cdots & 0 \\ 0 & a_{22} & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & a_{nn} \end{bmatrix} \text{and } R = \begin{bmatrix} 0 & a_{12} & \cdots & a_{1n} \\ a_{21} & 0 & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \cdots & 0 \end{bmatrix}.$$

Func-2) Write a C **function (INV_DIAGONAL)** which can find the inverse of the **diagonal** matrix D (equations are shown below). Arguments of this function are

- D matrix →input
- Dimension of the D matrix → input
- D^{-1}→ output

$$D^{-1} = \begin{cases} \dfrac{1}{a_{ii}}, & for\ i = 1,2,\dots,n \\ 0, & otherwise \end{cases} \qquad D^{-1} = \begin{bmatrix} \dfrac{1}{a_{11}} & 0 & \cdots & 0 & 0 \\ \vdots & & \ddots & & \vdots \\ 0 & 0 & \cdots & 0 & \dfrac{1}{a_{nn}} \end{bmatrix}$$

2) Write a C **program** which can find the subtraction of 2 given matrices.

- ask the dimensions of the input matrices,
- return an error message on console when dimensions of the given matrices are not appropriate,
- ask the elements of the input matrices one by one.

Hint: Use static array for the input matrices whose maximum dimensions are 100x100.