**Exercises:**

1. a) Create the following matrices with Phyton:

A=, B=, C=

1. Select the 3 last rows of the matrix A and save them as D
2. Calculate: F=A·D; DT=DT ; G=A·Id
3. Determine the rank of Matrix B
4. Calculate the inverse of Matrix C, if it is possible

2. Transform these two lists into numpy arrays.

Province=['02Albacete','03Alicante/Alacant','04Almería','01Araba/Álava','33Asturias','05Ávila','06Badajoz','07Balears,Illes','08Barcelona','48Bizkaia','09Burgos','10Cáceres','11Cádiz','39Cantabria','12Castellón/Castelló','13CiudadReal','14Córdoba','15Coruña,A','16Cuenca','20Gipuzkoa','17Girona','18Granada','19Guadalajara','21Huelva','22Huesca','23Jaén','24León','25Lleida','27Lugo','28Madrid','29Málaga','30Murcia','31Navarra','32Ourense','34Palencia','35Palmas,Las','36Pontevedra','26Rioja,La','37Salamanca','38SantaCruzdeTenerife','40Segovia','41Sevilla','42Soria','43Tarragona','44Teruel','45Toledo','46Valencia/València','47Valladolid','49Zamora','50Zaragoza','51Ceuta','52Melilla']

Population=[387735, 1904362, 723899, 329856, 1006193, 159062, 667000, 1223961, 5641485, 1133833, 353021, 386302, 1259339, 584407, 578506, 489950, 777414, 1120185, 198842, 713583, 776944, 929968, 266471, 532865, 222329, 622617, 452219, 437260, 324419, 6769113, 1711693, 1522640, 659232, 304104, 157340, 1153633, 942849, 315896, 326506, 1098831, 153812, 1960257, 89176, 823721, 133118, 707078, 2589308, 517758, 167846, 959140, 82533, 83196]

b) Calculate the matrix of provinces that have a population greater than one million. How many are there? To which provinces do they correspond? (determine them without using a loop)

3. Solve the following system of equations. What kind of system is it (incompatible system, determinate system or indeterminate system)?

x+2y-z=2

2y+3z=-1

-x+4z=-1

4. A competitive firm produces according to the following production function:  , where  is equal to the amount of kilograms of detergent produced and  is the number of working hours. The price of a kg of detergent is 1.65 euros and wages are 10 euros an hour.

a) Calculate the function of private benefits as a function of the number of working hours of the factory.

b) What is the production volume that maximizes profit in this factory? (You have to find the optimal number of working hours first). What is the maximum profit for this production volume? Check that it is a maximum.