A1 (5%) Submission due on 18 September 2020 (Friday)

Given $\mathbf{Xw} = \mathbf{y}$ where $\mathbf{X} = \begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \\ 7 & 8 \\ 9 & 10 \end{bmatrix}$ and $\mathbf{y} = \begin{bmatrix} 0 \\ 0 \\ 1 \\ 0 \\ 0 \end{bmatrix}$ constitute an example problem. Write a Python routine to find the least squares solution for $\mathbf{w}$ given arbitrary $\mathbf{X} \in \mathcal{R}^{5\times 2}$ and $\mathbf{y} \in \mathcal{R}^{5\times 1}$. Submit your Python code as a function with routine ("`def A1_MatricNumber(X,y)`") that takes in **X** and **y** as inputs and generate $(\mathbf{X}^\mathbf{T}\mathbf{X})^{-1}$ and **w** as outputs in a single file with filename "A1_StudentMatriculationNumber.py". Your Python routine should return the matrix $(\mathbf{X}^\mathbf{T}\mathbf{X})^{-1}$ (as numpy array) first and then the least squares solution vector **w** (as numpy array)**.** Hint: you will need "`import numpy as np`" and its matrix manipulation functions.

Please use the python template provided to you. Remember to rename both "A1_StudentMatriculationNumber.py" and "`A1_MatricNumber`" using your student matriculation number. For example, if your matriculation ID is A1234567R, then you should submit "A1_A1234567R.py" that contains the function "A1_A1234567R". Please do NOT zip/compress your file. Because of the large class size, **points will be deducted if instructions are not followed**. The way we would run your code might be something like this:

```
>> import A1_A1234567R as grading
>> InvXTX, w = grading.A1_A1234567R(X,y)
```

Marks allocation: `InvXTX` (2.5%), `w` (2.5%)

Submission folder: LumiNUS >> files >> A1
(The submission folder in LumiNUS will be closed on 18 September at 2359 hour)