# Problem set 1b

***Problem*** 1. Create two $4 \times 4$ matrices $A$ and $B$ with random values between 0 and 1. Then find the following:

(a) $A + B$ (b) $A - B$ (c) $A \cdot B$ (d) Determinant of $A$ (e) Transpose of $A$ (f) Inverse of $A$

***Problem*** 2. Construct and store a matrix $A$ that is filled row-wise with the values 1.41, 3.14, 1.61, 0, 9.83, 1729, 2.71,-1, 1, 9, 1.7, 0.19.

(a) Find the number of columns and rows of $A$.

(b) Create a square matrix $B$ by removing any column/row from $A$.

(c) Create an identity matrix $Id$ of the same size as $B$. Then confirm that $B \cdot B^{-1} - Id$ is a zero matrix.

(d) Find $A^T \cdot B^T$ or $A \cdot B^T$, whichever is possible.

***Problem*** 3. Create a vector with 12 integers. Convert the vector to a $4 \times 3$ matrix $C$ using `matrix()`.

***Problem*** 4. Create a vector `a.vec` of length 12 whose even entries are logical TRUE and odd entries are logical FALSE. Now shuffle the entries of `a.vec` randomly.

***Problem*** 5. Create a random vector of length ten that takes values between $[-1, 1]$. Find the indices corresponding to the negative values.

***Problem*** 6. Store the vector `c(8,8,4,4,5,1,5,6,6,8)` as `bar`. Identify the elements less than or equal to 6 AND not equal to 4.

***Problem*** 7. Store the vector `c(7,1,7,10,5,9,10,3,10,8)` as `foo`. Identify the elements greater than 5 OR equal to 2.

***Problem*** 8. Check whether any integer between 1 and 100 follow the equation $x^5 - 45x^4 + 810x^3 - 7290x^2 + 32805x - 59049$. If yes, find that integer.

***Problem*** 9. Solve the following system using `solve()`.

$$\begin{aligned} 2x - y &= 1 \\ -x + 2y - z &= 0 \\ -y - 2z - w &= 0 \\ -z + 2w &= 1 \end{aligned}$$