Problem set 2

Problem 1. Create two 4×4 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 4×3 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()`.

$$2x - y = 1$$
$$-x + 2y - z = 0$$
$$-y - 2z - w = 0$$
$$-z + 2w = 1$$