

## Problem set - 2

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  $A$
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.
3. Create a vector with 12 integers. Convert the vector to a  $4 \times 3$  matrix  $C$  using `matrix()`.
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.
5. Create a random vector of length ten that takes values between  $[-1, 1]$ . Find the indices corresponding to the negative values.
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.
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.
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.
9. Re-create exactly the following output:

```
"The quick brown fox
      jumped over
            the lazy dogs"
```
10. Suppose you've stored the values `num1 <- 4` and `num2 <- 0.75`. Write a line of R code that returns the following string:

```
[1] "The result of multiplying 4 by 0.75 is 3."
```
11. Store the string "Two 6-packs for \$12.99". Then do the following:
  - (a) Use a check for equality to confirm that the substring beginning with character 5 and ending with character 10 is "6-pack".
  - (b) Make it a better deal by changing the price to \$10.99.
12. Recreate exactly the following output using `paste`:

```
[1] "Group 1" "Group 2" "Group 3" "Group 4" "Group 5" "Group 6"
[7] "Group 7" "Group 8" "Group 9" "Group 10"
```