

# Homework 1

The problems listed below are HW-1 problems for my previous 2016 MATH-7608 class. As the Homework 1 assignment for this class, your job is to review all the submissions in the zip file attached. (1) Pick two top submissions and two bottom submissions with your comments (strength and weakness) on the four submissions that you picked. (2) Write answers (with various possible solutions, if possible) for the HW-1 problems below.

The due date is Feb, 19, 2018.

1. Give R assignment statements that set the variable  $z$  to
  - (a)  $x^{ab}$
  - (b)  $(x^a)^b$
  - (c)  $3x^3 + 2x^2 + 6x + 1$
  - (d) the digit in the second decimal place of  $x$  (hint: use `floor(x)` )
  - (e)  $z + 1$
  
2. Give R expressions that return the following matrices and vectors
  - (a) (1,2,3,4,5,6,7,8,7,6,5,4,3,2,1)
  - (b) (1,2,2,3,3,3,4,4,4,4,5,5,5,5,5)
  - (c)
$$\begin{pmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{pmatrix}$$
  - (d)
$$\begin{pmatrix} 0 & 2 & 3 \\ 0 & 5 & 0 \\ 7 & 0 & 0 \end{pmatrix}$$
  
3. Suppose `vec` is a vector of length 2. Interpreting `vec` as the coordinates of a point in  $R^2$ , use R to express it in polar coordinates. You will need (at least one of) the inverse trigonometric functions: `acos(x)` , `asin(x)` , and `atan(x)`.
  
4. Use R to produce a vector containing all integers from 1 to 100 that are not divisible by 2, 3, or 7.
  
5. Suppose that `queue <- c("Steve", "Russell", "Alison", "Liam")` and that `queue` represents a supermarket queue with Steve first in line. Using R expressions update the supermarket queue as successively:
  - (a) Barry arrives;
  - (b) Steve is served;

- (c) Pam talks her way to the front with one item;
- (d) Barry gets impatient and leaves;
- (e) Alison gets impatient and leaves.

For the last case you should not assume that you know where in the queue Alison is standing.

Finally, using the function `which(x)` , find the position of Russell in the queue.

Note that when assigning a text string to a variable, it needs to be in quotes.

6. Which of the following assignments will be successful? What will the vectors `x`, `y`, and `z` look like at each stage?

```
rm(list = ls())  
x <- 1  
x[3] <- 3  
y <- c()  
y[2] <- 2  
y[3] <- y[1]  
y[2] <- y[4]  
z[1] <- 0
```