Chapter 2: Exercises

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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

   (e) $z + 1$

2. Give R expression 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 strictly positive vector of length 2. Interpreting `vec` as coordinates of a point R^2, use R to express it in polar coordinates.

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", "Russel", "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 at each stage?

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

7. Build a 10×10 identity matrix. Then make all the non-zero elements 5. Do this latter step in at least two different ways.