

Instructions: A printed copy of your homework should be handed in at **the start of class** the day it is due. Supplementary electronic files (e.g. R scripts or wxMaxima files;) should be emailed to the instructor prior to class with file name format: **Lastname-hwX.ext**. Each part of each exercise is worth 10 points unless stated otherwise.

The following exercises should be done after working through the R script at http://pauljhurtado.com/teaching/SP18/MATH420/r_intro.r. Please consult the [R Intro for Math 420 \(PDF\)](#) on the website, or other online resources as needed.

Exercise 1: Use the functions `rnorm` and `matrix` to create a 5x7 matrix of Gaussian random numbers with mean 1 and variance 4.

```
matrix(rnorm(5*7,mean=1,sd=2), nrow=5, ncol=7)

##      [,1] [,2] [,3] [,4] [,5] [,6] [,7]
## [1,]  1.1030  2.352  0.01537 -0.6747 -1.321  1.878  2.2437
## [2,] -1.1571  2.594  1.78630  3.8912  2.384  1.126  2.6207
## [3,]  0.3611 -1.766  1.91959  0.9395  4.978 -1.829  1.6054
## [4,]  3.9414  2.908  2.13962  1.3139  1.869  1.610 -4.5909
## [5,] -0.6174  4.929 -1.83805  2.5634 -2.288  4.943  0.5732
```

Exercise 2: Write a script file to do the following:

1. Use `'runif'` (see R help by typing `?runif`) to construct a 5x5 matrix B of random numbers with a uniform distribution between 0 and 1.

```
B = matrix(runif(25), 5,5); B

##      [,1] [,2] [,3] [,4] [,5]
## [1,] 0.4839 0.4949 0.2715 0.05998 0.70225
## [2,] 0.8353 0.3220 0.1523 0.83310 0.65195
## [3,] 0.5476 0.3966 0.3647 0.68566 0.44438
## [4,] 0.5627 0.6136 0.8313 0.21561 0.11839
## [5,] 0.6215 0.4626 0.8434 0.43198 0.05027
```

2. Extract from it the second row, the second column, and the 3x3 matrix of values that are not at the margins (i.e not in the first or last row, or first or last column).

```
# See section 3.3 in the R Intro PDF on the course website.
B[2,]

## [1] 0.8353 0.3220 0.1523 0.8331 0.6520

B[,2]

## [1] 0.4949 0.3220 0.3966 0.6136 0.4626

B[2:4,2:4]

##      [,1] [,2] [,3]
```

```
## [1,] 0.3220 0.1523 0.8331
## [2,] 0.3966 0.3647 0.6857
## [3,] 0.6136 0.8313 0.2156
```

3. Use 'seq' to replace the values in the first row of B by 2 5 8 11 14.

```
B[1,]=seq(2,14,by=3); # or alternatively, use seq(2,14,length=5)
B
##      [,1]  [,2]  [,3]  [,4]  [,5]
## [1,]  2.0000 5.0000 8.0000 11.0000 14.0000
## [2,]  0.8353 0.3220 0.1523  0.8331  0.65195
## [3,]  0.5476 0.3966 0.3647  0.6857  0.44438
## [4,]  0.5627 0.6136 0.8313  0.2156  0.11839
## [5,]  0.6215 0.4626 0.8434  0.4320  0.05027
```

Exercise 3: Run `demo(graphics)`. Generate 1000 Normal random numbers with mean 0 and variance 1 and plot a histogram of the values. Add a title and color the histogram bars blue and submit the graphic as your solution to this exercise.

```
x=rnorm(1000,mean=0,sd=1)
hist(x,col="blue",main="Exercise 3", 40)
```

