UC Irvine: Division of Continuing Education

R Programming – Section 1: I&CSCI x425.20
Summer 2018
Homework 2

Date Given: July 16, 2018 Due Date: July 22, 2018

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1. Evaluate the following expressions in R. Check your answers by hand. (Lesson 2.2, Slide#4)

   $x = 5 + 8i$

   $y = -6 + 7i$

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   a) $u = x + y$
   b) $v = xy$
   c) $w = x / y$
   d) $z = e^x$
   e) $r = \sqrt{y}$
   f) $s = xy^2$

2. Use R to compute the following expressions. Check your answers by hand. (Lesson 2.2, Slide#4)

   a) $(3+6i)(-7-9i)$
   b) $\dfrac{5+4i}{5-4i}$
   c) $\dfrac{3}{2i}$

3. Use R to calculate the following expressions. Check your answers with a calculator. (Lesson 2.2, Slide #6, #8)

   a) $e^{(-2.1)^3} + 3.47\log(14) + \sqrt[4]{287}$
   b) $(3.4)^7 \log(14) + \sqrt[4]{287}$
   c) $\cos^2\left(\dfrac{4.12\pi}{6}\right)$
   d) $\cos\left(\dfrac{4.12\pi}{6}\right)^2$

4. Suppose that x = 6. Find the results of the following operations by hand and use R to check your results. (Lesson 2.2, Slide#13)

   a) z = (x < 10)
   b) z = (x == 10)
   c) z = (x >= 4)
   d) z = (x != 7)

5. Find the results of the following operations by hand and use R to check your results. (Lesson 2.2, Slide#18)
   a) z = 6>3+8
   b) z = 6+3>8
   c) z = 4>(2+9)
   d) z = (4<7)+3
   e) z = 4<7+3
   f) z = (4<7)*5
   g) z = 4<(7*5)
   h) z = 2/5>=5

6. Enter this matrix in R. (Lesson 2.1, Slide#14)

$$\mathbf{A} = \begin{bmatrix} 3 & 7 & -4 & 12 \\ -5 & 9 & 10 & 2 \\ 6 & 13 & 8 & 11 \\ 15 & 5 & 4 & 1 \end{bmatrix}$$

   a) Create a vector V consisting of the elements in the second column of A.
   b) Create a vector W consisting of the elements in the second row of A.

7. Store 20 random numbers with normal distribution and mean of 10 and standard deviation of 5 in a vector. Sort the vector. Remove the smallest 2 and the largest 2 elements from this vector. (Lesson 2.3, Slide#4)

8. Read the 'temperature.txt' file. This file contains the following data.
   - High and low temperature (degree centigrade)
   - Rainfall (centimeters)
   - Month (from 1 to 12)
   - Year (for 20 years - from 1987 – 2005)

   The first 3 lines of this file are as follows.

temperature	lower	rain	month	yr
10.8	6.5	12.2	1	1987
10.5	4.5	1.3	1	1987
7.5	-1	0.1	1	1987

   This file contains 6,940 lines of data.

   Compute the following statistics of temperature and rainfall data. (Lesson 2.3, Slide#7)
   - Mean, Max, Min, Standard deviation, Variance, Range

9. Using the text file of problem 8, compute the yearly average temperature for all the years (from 1987 – 2005). Which was the coldest year (year in which the average temperature was the lowest) and which was the warmest? (Lesson 2.3, Slide #7,#8,#9)

10. Store 100 random numbers with normal distribution and mean of 50 and standard deviation of 50 in a vector. Plot this histogram. (you will see the bell shaped Gaussian curve). Which number is the closet to the number 100? (Lesson 2.3, Slide #11)