UC Irvine: Division of Continuing Education

R Programming – Section 1: I&CSCI x425.20
Summer 2018
Homework 4

Date Given: July 30, 2018 Due Date: Aug 5, 2018

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1. It is known that the following Leibniz series converges to the value π/4 as n → ∞.

$$S(n) = \sum_{k=0}^{n} (-1)^k \frac{1}{2k+1}$$

Plot the difference between π/4 and sum S(n) versus n for 0 ≤ n ≤ 200.

2. The Virginia Cooperative Extension reports that the mean weight of yearling Angus steers is 1,152 pounds. Suppose that weights of all such animals can be described by a Normal model with a standard deviation of 84 pounds.

   Plot the normal distribution curve (μ = 1,152 and σ = 84). Fill the distribution curve with your choice of color:
   a. Where weight is over 1,250 pounds
   b. Where weight is under 1,200 pounds
   c. Where weight is between 1,000 and 1,100 pounds

3. Read the 'temperature.txt' file (this is the same file that we used in homework#2). 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 6 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
6.5	-3.3	1.1	1	1987
10	5	3.5	1	1987

   This file contains 6,940 lines of data.

   Create a boxplot of 'high temperature' using 'month' as a factor variable.

4. In a Binomial experiment with 'n' trials, the probability of success is 'p' in each trial. The probability of exactly 'x' successes in 'n' trials is given by the following expression.

$$P(x : successes) = \left({}_nC_x p^x (1-p)^{(n-x)}\right)$$

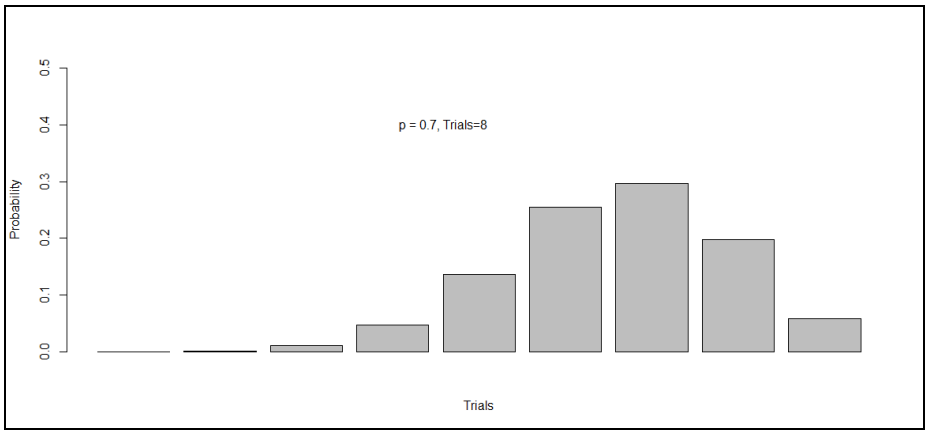
Suppose the probability of success (p) = 0.7 (probability of failure is (1 – 0.7) = 0.3). Therefore, in 8 trials (n = 8), the probability of exactly 5 successes (x = 5) is:

$$= {}_8C_5 (0.7)^5 (0.3)^{(8-5)} = 0.25412$$

Similarly, the following probabilities can be computed:

0 success	1 success	2 success	3 success	4 success	5 success	6 success	7 success	8 success	SUM of Probabilities
0.00006	0.00122	0.01	0.04667	0.13613	0.25412	0.29647	0.1977	0.05764	1.00

The barplot of the above table is as follows.



Vary the probability of success from 0.1 to 0.9 and generate the following 9 barplots in R that represent the probability of 'x' successes in '8' trials.