Lab: Simulation with R

2019-03-18

1. Use simulation to estimate $\int_0^1 \sin(x)\,dx$ (hint: approximate an area by counting dots).

2. You toss two fair dice simultaneously (with each dice having values one through six). We wonder the probability that they turn out the same numbers. Implement the simulation of 1000 times tossing experiment to estimate this probability.

3. We observed one product's weight with its unique 20 available sample. Bootstrap sample 200 times to provide interval estimation of weight's mean value with 90% confidence level. The observation are as follows:
(119,120,131,209,210,337,332,287,146,129,232,169,208,253,142,105,419,179,324,287)

4. Provide interval estimates of regression coefficients α and β in $y = \alpha + \beta x$ with 90% confidence level.

ID	x	y
1	1	13
2	2	14
3	3	15
4	5	18
5	4	22

5. Use placebo test to explore whether children who received milk from bottle as a child had worse or better teeth health conditions than those who had not received mild from the bottle. For 19 randomly selected children was recorded when they had their first incident of caries:

Bottle	Age	Bottle	Age
No	9	Yes	12
Yes	14	Yes	13
Yes	15	No	20
No	10	Yes	13
No	12	Yes	16
No	6	Yes	14
Yes	19	Yes	9
No	10	No	12
No	8	Yes	12
No	6		

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bottle <- c(0,1,1,0,0,0,1,0,0,0,1,1,0,1,1,1,1,0,1)
age <- c(9,14,15,10,12,6,19,10,8,6,12,13,20,13,16,14,9,12,12)
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