HW-2.R

rstudio-user

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#Name: "Lauren Done"  
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#Title: "HW2"  
#Output: R-Script  
  
##Simulating The Dice Roll On R  
  
#20 rolls  
  
how\_many\_rolls <- 20  
sim\_rolls <- sample(1:6, how\_many\_rolls, replace = TRUE)  
  
#49 more simulations using a loop  
  
lots\_of\_sim\_rolls <- sample(1:6,how\_many\_rolls, replace = TRUE)  
  
for (indx in 1:49) {  
 sim\_rolls <- sample(1:6,how\_many\_rolls, replace = TRUE)  
 lots\_of\_sim\_rolls <- data.frame(lots\_of\_sim\_rolls,sim\_rolls)  
}  
  
#1000 more simulations using a vector  
  
how\_many\_sims <- 50  
sim\_rolls\_vec <- sample(1:6,(how\_many\_rolls\*how\_many\_sims), replace = TRUE) # vectorized version  
  
#analyzing the rolls - loop  
  
if\_come\_up\_6 <- as.numeric(lots\_of\_sim\_rolls == 6)  
mean(if\_come\_up\_6)

## [1] 0.151

#analyzing the rolls - vector  
  
if\_come\_up\_6\_vec <- as.numeric(sim\_rolls\_vec == 6)  
mean(if\_come\_up\_6\_vec)

## [1] 0.148

##PP1 - one roll  
  
one\_roll <- 1  
sample(1:6, one\_roll, replace = TRUE)

## [1] 2

#logic: roll once; if get 6 then conclude the dice is not fair; if roll any other number then conclude it is fair.   
#conclusion: dice is fair.  
#analysis: Intuitively, the probability that it would be judged to be unfair is 5/6 - but because it is just one roll it is unknown.  
  
###PP2 - 20 rolls and Our Own Experiment Protocol  
  
sim\_rolls

## [1] 5 2 3 5 1 1 1 2 4 3 4 3 6 1 6 2 1 1 5 4

#logic/rule: We started with Intuition:   
#"The chance of rolling any face is about 17%.. So if you roll a 6 more than 17% of the time (number of rolls) then that’s considered “not fair”   
#X < %16 of the time = fair  
#X > %16 of the time = not fair  
#Where “X” is the die landing on the #6  
#%17 of of 20 rolls is 3.4  
#Therefore 3 or more 6s is "not fair".  
#Therefore 2 or less 6s is "fair"."  
  
#conclusion:   
#sim\_rolls R die is not fair  
#Lauren's unaltered die is fair. Lauren's altered (melted) die is not fair.  
#Thurkur's two unaltered dice are not fair.  
#Kyle's unaltered die is not fair. Kyle's altered (drilled) die is not fair.  
#note: .csv for dice experiments uploaded on Lab 1 channel.  
  
#confidence: intuitively, most individuals believe that a completely unaltered die, such as the R script we ran and our real dice would be "fair". However, out of the 5 unaltered dice we used for our experiment, 3 were "not fair" according to our rule of choice. This shows our difficult it is to numerically define certain properties and values to phenomena.  
#modificaitons: I would roll of the truly alterted die more than once and compare the results to a truly unaltered die such as "sim\_rolls\_vec".  
  
#Consider the stats question: if fair dice (two) are rolled 20 times, what is likely number of 6 resulting?   
"1/6\*2 = .333"

## [1] "1/6\*2 = .333"

#Analyze PP2 including the question: if the dice were fair, what is the chance it could be judged as unfair?  
  
##PP3   
  
hella\_rolls <- 100  
one\_hundred\_rolls <- sample(1:6,hella\_rolls, replace = TRUE)  
table\_of\_rolls <- table(one\_hundred\_rolls)  
as.data.frame(table(one\_hundred\_rolls))

## one\_hundred\_rolls Freq  
## 1 1 18  
## 2 2 16  
## 3 3 14  
## 4 4 16  
## 5 5 14  
## 6 6 22

"one\_hundred\_rolls Freq  
1 1 18  
2 2 23  
3 3 14  
4 4 15  
5 5 14  
6 6 16"

## [1] "one\_hundred\_rolls Freq\n1 1 18\n2 2 23\n3 3 14\n4 4 15\n5 5 14\n6 6 16"

#what about the edge cases?   
#they should be considered part of the calculation since their occurence is randomized and possible, even if rare.  
  
#Is it fair to say that every conclusion has some level of confidence attached?   
#yes, and because anything is possible there should never be 100% confidence attached to these values. However with repeated experimentation and observation using a fair die we can begin to see the that the frequencies for each face of the die do not differ immensely from each other.  
  
#Analysis of PP3: Looking only at 6, the probability of 6s in this set is fair because 16/100=.16 which is exactly equal to the 1/6 probability we would expect for each side of a fair die.  
  
#Boundaries: Boundaries should be environemental and external, not only purely numerical - the dice should be rolled the same way, over the same surface repeatedly, for example.  
  
#What is the chance that fair dice could be judged to be unfair?  
#for the dice to be fair, the frequencies must stay close to the expected value of 167. (1/6) If the values differed by more than 100, then confidence would decrease.  
#...in the case of 1,000 die rolls:  
  
  
"dice.roll.sample <- sample(x = 1:6, size = 1000, replace = TRUE)  
as.data.frame(table(dice.roll.sample))  
dice.roll.sample Freq  
1 1 146  
2 2 172  
3 3 157  
4 4 196  
5 5 171  
6 6 158"

## [1] "dice.roll.sample <- sample(x = 1:6, size = 1000, replace = TRUE)\nas.data.frame(table(dice.roll.sample))\ndice.roll.sample Freq\n1 1 146\n2 2 172\n3 3 157\n4 4 196\n5 5 171\n6 6 158"

#The conclusion should be that the dice is fair, since the rolls do not stray significantly from the expected value