```
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>
>
> Name <- c("Anna", "Sarah", "Luke", "Viren", "Alex", "Alton", "Ani", "Mila")
> ID <- 1:8
> iPad <- c("No", "No", "Yes", "No", "Yes", "Yes", "No", "Yes")
>
> #Part - 2 Lab Questions
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> #-----------------------------------------------------------------------------------------------
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>
> #---Simple Random Samples---#
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>
> #1. Draw a simple random sample of size 4 using the above function, sample().
> # Which IDs were chosen for your sample? What are the names of the individuals in your sample?
>
> # Draw a simple random sample of size 4
> sampled_IDs <- sample(ID, size = 4, replace = FALSE)
>
> # Print the IDs and names that were chosen for the sample
> print(sampled_IDs)
[1] 4 3 1 8
>
> text4 <- "Corresponding Names: "
> print(paste("Corresponding names:", Name[sampled_IDs]))
[1] "Corresponding names: Viren" "Corresponding names: Luke"
[3] "Corresponding names: Anna"  "Corresponding names: Mila"
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> #-----------------------------------------------------------------------------------------------
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>
> #2. Calculate the sample proportion, i.e., the percentage of Yes in your sample, of who wants t
o
> # purchase the iPad air.
>
> # Print IDs for the following random sample set
> iPad[sampled_IDs]
[1] "No"  "Yes" "No"  "Yes"
>
> # Temp value for IDs for Propotionate Calculation
> temp_IDs <- iPad[sampled_IDs]
>
> # Calculating the Proption Percentage of "Yes"
> sample_prop = sum(temp_IDs == "Yes")/length(temp_IDs)*100
>
> # Print the sample proportion
> print(paste("Sample proportion of Yes:", sample_prop, "%"))
[1] "Sample proportion of Yes: 50 %"
>
>
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>
> #3. Draw another sample of size 4 and calculate the sample proportion. Do you think the sample
> # proportion will remain the same
>
>
> # Draw another simple random sample of size 4
> sampled_IDs2 <- sample(ID, size = 4, replace = FALSE)
>
> # Extract the iPad responses of the individuals in the new sample
> sampled_iPad2 <- iPad[sampled_IDs2]
>
> # Calculate the sample proportion of Yes in the new sample
> sample_prop2 <- mean(sampled_iPad2 == "Yes") * 100
>
> # Print the sample proportion of Yes in the new sample
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> print(paste("Sample proportion of Yes in the new sample:", sample_prop2, "%"))
[1] "Sample proportion of Yes in the new sample: 25 %"
>
> # Compare the sample proportions of Yes in the two samples
> if (sample_prop2 == sample_prop) {
+   print("The sample proportions are the same.")
+ } else {
+   print("The sample proportions are different.")
+ }
[1] "The sample proportions are different."
>
>
> #----------------------------------------------------------------------------------------------
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> #----------------------------------------------------------------------------------------------
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>
> #---Simple Random Samples vs Stratified Samples---#
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>
> Name_2 <- c("Charles", "Heath", "Daria", "Jack", "Joe", "Nick", "Spencer", "Ryan", "Nigel", "Ra
yna")
> ID_2 <- 1:10
> Major <- c("E", "E", "A", "E", "E", "E", "V", "E", "A", "V")
>
> #----------------------------------------------------------------------------------------------
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>
> #4. Draw a simple random sample of size 4 using “sample()”. Is violin major represented in your
> # sample?
>
> # Creating 4 random samples and printing out sample data set
> random_sample = sample(ID, size = 4, replace = FALSE)
> print(random_sample)
[1] 7 2 3 1
> print(Name_2[random_sample])
[1] "Spencer" "Heath"   "Daria"   "Charles"
> print(Major[random_sample])
[1] "V" "E" "A" "E"
>
> # Check if there are any Violin Majors in the randomly created sample dataset
> if ("V" %in% Major[random_sample]) {
+   print("There is a Violin Major in the following sample.")
+ } else {
+   print("There are no Violin Majors in the following data set.")
+ }
[1] "There is a Violin Major in the following sample."
>
> #----------------------------------------------------------------------------------------------
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>
> #5. Name two advantages of stratified sampling compared to simple random samples. Explain an
> # advantage of stratified sampling in terms of the violinists
>
>
> # Stratified sampling has two advantages over simple random sampling. Firstly, stratified sampl
ing ensures
> # that the sample represents all relevant subgroups in the population, which is achieved by div
iding the
> # population into homogeneous subgroups. Consequently, each subgroup is adequately represented
in the sample,
> # which leads to less sampling bias and more accurate estimates. Secondly, when resources are l
imited,
> # stratified sampling is more efficient than simple random sampling. By allocating resources to
 the most
> # important or variable subgroups, stratified sampling can increase the accuracy of the estimat
es while
> # reducing the sample size, allowing for a more efficient use of resources. This is particularl
y useful
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> # when resources are limited.
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> #-----------------------------------------------------------------------------------------------
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>
> #6. Now stratify by major. Draw a simple random sample of 3 engineers from the 6 engineers, 1
> # architect from the 2 architects, and 1 violin major from the 2 violinists. What are the names
 of
> # the 5 people in your sample?
>
>
> # Stratify the population by major
> engineers <- Name_2[Major == "E"]
> architects <- Name_2[Major == "A"]
> violinists <- Name_2[Major == "V"]
>
> # Draw a simple random sample of 3 engineers, 1 architect, and 1 violinist
> engineer_sample <- sample(engineers, size = 3, replace = FALSE)
> architect_sample <- sample(architects, size = 1, replace = FALSE)
> violinist_sample <- sample(violinists, size = 1, replace = FALSE)
>
> #Printing out the Samples
> text_1 <- "Engineers :"
> text_2 <- "Architects :"
> text_3 <- "Violinists :"
>
> print(paste(text_2, architect_sample))
[1] "Architects : Daria"
> print(paste(text_3, violinist_sample))
[1] "Violinists : Spencer"
> cat(text_1, engineer_sample)
Engineers : Jack Nick Charles>
>
> #-----------------------------------------------------------------------------------------------
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