R script:

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# MIS 545 Section 02
# Lab10DineshA.R
# to import a dataset of Instacart grocery transactions and generate
# association rules among items in a transaction. We will be importing
# csv files,
# assigning data types, generating strong association rules,
# and interpreting association rules.

# install.packages("tidyverse")
# install.packages("arules")

library(tidyverse)
library(arules)

# set the working directory
setwd("~/MIS/Classes/MIS545/Assignments/Lab10")

instacartTransactions <- read.transactions(file =
"InstacartTransactions.csv",
                                  format = "single",
                                  header = TRUE,
                                  sep = ",",
                                  cols = c("OrderID", "ItemID")
                                  )

# print the riceFarms tibble
print(instacartTransactions)

# print the structure of riceFarms
print(str(instacartTransactions))

# print the summary of riceFarms
print(summary(instacartTransactions))

# print the first three transactions
inspect(instacartTransactions[1:3])

# print the frequency of 24852 (bananas)
itemFrequency(instacartTransactions[, "24852"])

# convert the frequency values into a tibble
instacartTransactionsFrequency <-
  tibble(Items = names(itemFrequency(instacartTransactions)),
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          Frequency = itemFrequency(instacartTransactions))

# display the item frequencies in the console
print(instacartTransactionsFrequency)

# display the ten most frequently occurring items
instacartTransactionsFrequency %>%
  arrange(desc(Frequency)) %>%
  slice(1:10)

# generating the association rules for instacart online transactions
instacartTransactionRules <-
  apriori(instacartTransactions,
          parameter = list(
            support = 0.005,
            confidence = 0.2,
            minlen = 2))

# display the summary of online transaction rules
print(summary(instacartTransactionRules))

# display the first 10 association rules
inspect(instacartTransactionRules[1:10])

# sort the association rules by lift and view the top 10
instacartTransactionRules %>%
  sort(by = "lift") %>%
  head(n = 10) %>%
  inspect()
```

Answers:

2. **Banana, bag of organic bananas, organic strawberries, organic baby spinach, and large lemon** are the five most frequently bought items.

3. The association rule with the highest lift number suggests that people who bought organic garlic are **6.3 times** likely to buy organic yellow onion compared to if buying the organic yellow onion alone. So, they need to be placed strategically in a supermarket to increase the sales.

4. The association rule with the 5[th] highest lift number suggests that given that a person has bought a bag of organic bananas and organic strawberries he or she is **4.3 times** likely to buy organic hass avocado as compared to buying the organic hass avocado alone. Instacart can take advantage of this by placing these items relatively further away from each other, so that people who are anyway going to buy these items take a glance at other items on their way and thus increase the sales overall.

5. The support, confidence and lift values for the association rule with 10[th] highest value is as follows:

Support of {organic raspberries, organic strawberries} = **0.0126**
This means that in our current dataset of 99573 transactions, 0.0126 fraction of those transactions contain this itemset.

Confidence of {organic raspberries, organic strawberries} = **0.3002**
This means, given that a person has bought organic raspberries, there is a 30% chance that he or she will also buy organic strawberries.

Lift of {organic raspberries, organic strawberries} = **3.63**
This means that the sale of organic strawberries increases 3.63 times if organic raspberries are also bought as compared to buying the organic strawberries alone.