QBS103 Project Submission 1 - Elodie Richard

2024-07-25

project1.data <- list.files(path = "/Users/elodierichard/Documents/QBS103/Project Submission 1 Data", pattern = ".csv")  
print(project1.data) #I first moved both data files into one folder on my laptop to retrieve it

## [1] "QBS103\_GSE157103\_genes.csv" "QBS103\_GSE157103\_series\_matrix.csv"

setwd("/Users/elodierichard/Documents/QBS103/Project Submission 1 Data") #this is to set the working directory to the data files in this folder  
  
genes <- read.csv("QBS103\_GSE157103\_genes.csv") #this is to rename and retrieve the first gene data file  
the\_matrix <- read.csv("QBS103\_GSE157103\_series\_matrix.csv") #this is to rename and retrieve the second series matrix data file  
  
head(genes) #this is used to visualize the data and only for 6 rows

## X COVID\_01\_39y\_male\_NonICU COVID\_02\_63y\_male\_NonICU  
## 1 A1BG 0.49 0.29  
## 2 A1CF 0.00 0.00  
## 3 A2M 0.21 0.14  
## 4 A2ML1 0.04 0.00  
## 5 A3GALT2 0.07 0.00  
## 6 A4GALT 0.00 0.00  
## COVID\_03\_33y\_male\_NonICU COVID\_04\_49y\_male\_NonICU COVID\_05\_49y\_male\_NonICU  
## 1 0.26 0.45 0.17  
## 2 0.00 0.01 0.00  
## 3 0.03 0.09 0.00  
## 4 0.02 0.07 0.05  
## 5 0.00 0.00 0.07  
## 6 0.00 0.00 0.00  
## COVID\_06\_.y\_male\_NonICU COVID\_07\_38y\_female\_NonICU COVID\_08\_78y\_male\_ICU  
## 1 0.21 0.49 0.12  
## 2 0.00 0.01 0.00  
## 3 0.08 0.23 0.08  
## 4 0.04 0.03 0.01  
## 5 0.00 0.07 0.00  
## 6 0.00 0.00 0.00  
## COVID\_09\_64y\_female\_ICU COVID\_10\_62y\_male\_ICU COVID\_11\_52y\_female\_NonICU  
## 1 0.51 0.10 0.38  
## 2 0.01 0.00 0.02  
## 3 0.88 0.13 0.47  
## 4 0.02 0.01 0.03  
## 5 0.79 0.15 0.08  
## 6 0.00 0.00 0.00  
## COVID\_12\_50y\_male\_ICU COVID\_13\_37y\_male\_NonICU COVID\_14\_55y\_male\_ICU  
## 1 0.45 0.18 0.23  
## 2 0.00 0.00 0.00  
## 3 0.16 0.07 0.22  
## 4 0.00 0.01 0.04  
## 5 1.75 0.00 0.93  
## 6 0.00 0.00 0.00  
## COVID\_15\_68y\_male\_ICU COVID\_16\_48y\_male\_NonICU COVID\_17\_54y\_male\_NonICU  
## 1 0.42 0.41 0.63  
## 2 0.00 0.01 0.02  
## 3 0.07 0.58 0.15  
## 4 0.00 0.00 0.02  
## 5 0.15 0.19 0.00  
## 6 0.03 0.00 0.00  
## COVID\_18\_70y\_female\_NonICU COVID\_19\_51y\_male\_NonICU COVID\_20\_62y\_male\_ICU  
## 1 0.47 0.33 0.32  
## 2 0.00 0.02 0.00  
## 3 0.30 0.11 0.07  
## 4 0.02 0.02 0.00  
## 5 0.06 0.00 0.22  
## 6 0.03 0.00 0.00  
## COVID\_21\_66y\_male\_ICU COVID\_22\_43y\_male\_ICU COVID\_23\_76y\_male\_ICU  
## 1 0.18 0.09 0.18  
## 2 0.00 0.00 0.01  
## 3 0.00 0.06 0.03  
## 4 0.00 0.00 0.00  
## 5 0.37 0.06 0.07  
## 6 0.03 0.00 0.03  
## COVID\_24\_55y\_male\_ICU COVID\_25\_55y\_male\_ICU COVID\_26\_41y\_female\_ICU  
## 1 0.22 0.29 0.42  
## 2 0.01 0.00 0.00  
## 3 0.11 0.09 0.18  
## 4 0.02 0.03 0.00  
## 5 0.15 0.00 0.87  
## 6 0.00 0.00 0.00  
## COVID\_27\_71y\_female\_ICU COVID\_28\_63y\_male\_ICU COVID\_29\_63y\_female\_ICU  
## 1 0.16 0.18 0.35  
## 2 0.01 0.00 0.00  
## 3 0.23 0.18 0.03  
## 4 0.01 0.05 0.03  
## 5 0.18 0.45 0.15  
## 6 0.00 0.00 0.03  
## COVID\_30\_54y\_male\_ICU COVID\_31\_50y\_male\_ICU COVID\_32\_72y\_male\_ICU  
## 1 0.23 0.15 0.34  
## 2 0.00 0.00 0.01  
## 3 0.11 0.47 0.04  
## 4 0.01 0.00 0.00  
## 5 0.00 0.00 0.29  
## 6 0.00 0.03 0.00  
## COVID\_33\_81y\_male\_NonICU COVID\_34\_64y\_female\_NonICU  
## 1 0.35 0.36  
## 2 0.00 0.00  
## 3 0.30 0.11  
## 4 0.06 0.00  
## 5 0.26 0.12  
## 6 0.00 0.00  
## COVID\_35\_58y\_female\_NonICU COVID\_36\_68y\_male\_NonICU COVID\_37\_87y\_male\_NonICU  
## 1 0.26 0.18 0.20  
## 2 0.00 0.01 0.00  
## 3 0.51 0.09 0.09  
## 4 0.02 0.00 0.07  
## 5 0.16 0.08 0.31  
## 6 0.00 0.00 0.00  
## COVID\_38\_68y\_male\_ICU COVID\_39\_80y\_female\_ICU COVID\_40\_66y\_male\_ICU  
## 1 0.29 0.19 0.22  
## 2 0.00 0.00 0.00  
## 3 0.10 0.27 0.17  
## 4 0.02 0.00 0.00  
## 5 0.35 0.00 0.08  
## 6 0.00 0.07 0.00  
## COVID\_41\_74y\_male\_ICU COVID\_42\_21y\_female\_ICU COVID\_43\_83y\_female\_ICU  
## 1 0.19 0.24 0.29  
## 2 0.00 0.01 0.00  
## 3 0.14 0.33 0.00  
## 4 0.00 0.01 0.00  
## 5 0.19 0.39 0.11  
## 6 0.00 0.00 0.00  
## COVID\_44\_46y\_male\_ICU COVID\_45\_62y\_female\_ICU COVID\_46\_62y\_male\_ICU  
## 1 0.22 0.14 0.53  
## 2 0.00 0.00 0.01  
## 3 0.14 0.15 0.10  
## 4 0.00 0.03 0.00  
## 5 0.00 0.19 0.06  
## 6 0.04 0.00 0.00  
## COVID\_47\_78y\_male\_ICU COVID\_48\_72y\_female\_ICU COVID\_49\_73y\_male\_ICU  
## 1 0.08 0.19 0.48  
## 2 0.01 0.00 0.00  
## 3 0.04 0.06 0.09  
## 4 0.03 0.01 0.03  
## 5 0.60 0.23 0.00  
## 6 0.00 0.06 0.00  
## COVID\_50\_37y\_male\_ICU COVID\_51\_58y\_female\_NonICU COVID\_52\_71y\_male\_NonICU  
## 1 0.08 0.21 0.25  
## 2 0.00 0.00 0.01  
## 3 0.01 0.13 0.00  
## 4 0.00 0.00 0.03  
## 5 0.00 0.00 0.00  
## 6 0.72 0.00 0.00  
## COVID\_53\_35y\_female\_NonICU COVID\_55\_62y\_female\_ICU COVID\_56\_33y\_female\_NonICU  
## 1 0.25 0.09 0.28  
## 2 0.00 0.00 0.00  
## 3 0.64 0.09 0.16  
## 4 0.10 0.01 0.09  
## 5 0.00 0.00 0.23  
## 6 0.00 0.00 0.00  
## COVID\_57\_30y\_female\_NonICU COVID\_58\_62y\_male\_NonICU COVID\_59\_55y\_male\_NonICU  
## 1 0.42 0.39 0.33  
## 2 0.00 0.00 0.00  
## 3 0.27 0.08 0.10  
## 4 0.01 0.00 0.00  
## 5 0.19 0.00 0.07  
## 6 0.05 0.00 0.00  
## COVID\_60\_49y\_male\_NonICU COVID\_61\_54y\_female\_NonICU COVID\_62\_78y\_female\_ICU  
## 1 0.22 0.25 0.21  
## 2 0.00 0.00 0.00  
## 3 0.14 0.10 0.04  
## 4 0.00 0.03 0.00  
## 5 0.00 0.13 0.05  
## 6 0.02 0.00 0.00  
## COVID\_63\_39y\_female\_ICU COVID\_64\_65y\_male\_ICU COVID\_65\_84y\_male\_NonICU  
## 1 0.29 0.38 0.40  
## 2 0.00 0.01 0.01  
## 3 0.01 0.04 0.07  
## 4 0.00 0.02 0.00  
## 5 0.14 0.56 0.58  
## 6 0.00 0.00 0.00  
## COVID\_66\_66y\_female\_NonICU COVID\_67\_57y\_male\_ICU COVID\_68\_79y\_male\_ICU  
## 1 0.64 0.37 0.58  
## 2 0.00 0.00 0.00  
## 3 0.00 0.35 0.15  
## 4 0.00 0.00 0.01  
## 5 0.00 0.00 0.00  
## 6 0.00 0.00 0.05  
## COVID\_69\_77y\_female\_NonICU COVID\_70\_81y\_male\_NonICU COVID\_71\_37y\_male\_ICU  
## 1 0.52 0.27 0.07  
## 2 0.00 0.00 0.01  
## 3 0.29 0.07 0.12  
## 4 0.02 0.00 0.01  
## 5 0.00 0.00 0.00  
## 6 0.00 0.06 0.00  
## COVID\_72\_50y\_female\_NonICU COVID\_73\_82y\_male\_NonICU COVID\_74\_55y\_female\_ICU  
## 1 0.52 0.46 0.24  
## 2 0.00 0.01 0.00  
## 3 0.10 0.02 0.12  
## 4 0.01 0.02 0.02  
## 5 0.00 0.17 0.26  
## 6 0.00 0.04 0.00  
## COVID\_75\_55y\_male\_NonICU COVID\_76\_73y\_female\_ICU COVID\_77\_55y\_female\_ICU  
## 1 0.23 0.17 0.05  
## 2 0.01 0.00 0.00  
## 3 0.14 0.09 0.01  
## 4 0.00 0.01 0.00  
## 5 0.00 0.04 0.00  
## 6 0.00 0.00 0.00  
## COVID\_78\_80y\_male\_NonICU COVID\_79\_27y\_male\_NonICU COVID\_80\_71y\_male\_ICU  
## 1 0.19 0.08 0.28  
## 2 0.00 0.01 0.00  
## 3 0.20 0.03 0.05  
## 4 0.00 0.00 0.00  
## 5 0.00 0.00 0.05  
## 6 0.00 0.00 0.00  
## COVID\_82\_67y\_male\_NonICU COVID\_83\_85y\_female\_NonICU  
## 1 0.39 0.47  
## 2 0.01 0.00  
## 3 0.10 0.18  
## 4 0.00 0.05  
## 5 0.00 0.00  
## 6 0.00 0.00  
## COVID\_84\_75y\_female\_NonICU COVID\_85\_62y\_male\_ICU COVID\_86\_52y\_female\_NonICU  
## 1 0.35 0.29 0.60  
## 2 0.00 0.00 0.00  
## 3 0.03 0.04 0.27  
## 4 0.00 0.00 0.02  
## 5 0.17 0.00 0.00  
## 6 0.00 0.00 0.00  
## COVID\_87\_61y\_male\_ICU COVID\_89\_90y\_female\_NonICU COVID\_90\_86y\_female\_NonICU  
## 1 0.65 0.20 0.40  
## 2 0.00 0.00 0.00  
## 3 0.15 0.07 0.05  
## 4 0.00 0.03 0.01  
## 5 0.00 0.14 0.31  
## 6 0.00 0.00 0.02  
## COVID\_91\_29y\_female\_NonICU COVID\_92\_82y\_female\_ICU COVID\_93\_81y\_female\_ICU  
## 1 0.60 0.34 0.37  
## 2 0.00 0.00 0.00  
## 3 0.03 0.02 0.11  
## 4 0.02 0.04 0.00  
## 5 0.05 0.58 0.05  
## 6 0.00 0.00 0.00  
## COVID\_94\_24y\_female\_NonICU COVID\_95\_49y\_male\_NonICU COVID\_96\_51y\_male\_NonICU  
## 1 0.81 0.37 1.61  
## 2 0.00 0.01 0.00  
## 3 0.17 0.20 0.02  
## 4 0.02 0.02 0.00  
## 5 0.00 0.15 0.00  
## 6 0.06 0.00 0.00  
## COVID\_97\_76y\_male\_ICU COVID\_98\_81y\_male\_NonICU COVID\_99\_71y\_male\_ICU  
## 1 0.19 0.78 0.33  
## 2 0.00 0.00 0.00  
## 3 0.02 0.26 0.02  
## 4 0.05 0.00 0.00  
## 5 0.12 0.37 0.04  
## 6 0.03 0.00 0.00  
## COVID\_100\_74y\_female\_NonICU COVID\_101\_58y\_male\_ICU COVID\_102\_84y\_male\_NonICU  
## 1 0.30 0.33 0.12  
## 2 0.00 0.00 0.00  
## 3 0.09 0.11 0.01  
## 4 0.00 0.03 0.01  
## 5 0.04 0.05 0.00  
## 6 0.00 0.00 0.07  
## COVID\_103\_83y\_male\_NonICU NONCOVID\_01\_54y\_female\_NonICU  
## 1 0.20 0.89  
## 2 0.00 0.00  
## 3 0.03 0.04  
## 4 0.03 0.00  
## 5 0.04 0.00  
## 6 0.00 0.00  
## NONCOVID\_02\_65y\_male\_ICU NONCOVID\_03\_65y\_male\_ICU NONCOVID\_04\_90y\_male\_NonICU  
## 1 0.32 0.44 0.21  
## 2 0.00 0.00 0.00  
## 3 0.01 0.05 0.05  
## 4 0.00 0.02 0.00  
## 5 0.04 0.04 0.21  
## 6 0.00 0.00 0.00  
## NONCOVID\_05\_83y\_female\_NonICU NONCOVID\_06\_75y\_female\_ICU  
## 1 0.31 0.89  
## 2 0.00 0.00  
## 3 0.01 0.14  
## 4 0.01 0.01  
## 5 0.00 0.00  
## 6 0.00 0.06  
## NONCOVID\_07\_50y\_male\_ICU NONCOVID\_08\_53y\_female\_ICU  
## 1 0.45 0.47  
## 2 0.00 0.01  
## 3 0.07 0.04  
## 4 0.02 0.00  
## 5 0.00 0.15  
## 6 0.00 0.00  
## NONCOVID\_09\_49y\_female\_NonICU NONCOVID\_10\_67y\_male\_ICU  
## 1 0.40 0.33  
## 2 0.00 0.00  
## 3 0.04 0.05  
## 4 0.00 0.01  
## 5 0.00 0.23  
## 6 0.00 0.08  
## NONCOVID\_11\_58y\_female\_NonICU NONCOVID\_12\_82y\_male\_ICU  
## 1 0.58 0.12  
## 2 0.00 0.00  
## 3 0.03 0.02  
## 4 0.00 0.00  
## 5 0.00 0.00  
## 6 0.00 0.02  
## NONCOVID\_13\_65y\_male\_ICU NONCOVID\_14\_75y\_female\_ICU  
## 1 0.31 0.16  
## 2 0.00 0.00  
## 3 0.04 0.08  
## 4 0.01 0.00  
## 5 0.32 0.05  
## 6 0.02 0.02  
## NONCOVID\_15\_83y\_unknown\_ICU NONCOVID\_16\_40y\_female\_ICU  
## 1 0.59 0.34  
## 2 0.00 0.00  
## 3 0.03 0.07  
## 4 0.04 0.00  
## 5 0.00 0.13  
## 6 0.19 0.00  
## NONCOVID\_17\_84y\_female\_ICU NONCOVID\_18\_88y\_male\_ICU  
## 1 0.37 0.33  
## 2 0.00 0.00  
## 3 0.07 0.06  
## 4 0.01 0.00  
## 5 0.18 0.00  
## 6 0.00 0.00  
## NONCOVID\_19\_66y\_female\_ICU NONCOVID\_20\_62y\_female\_ICU  
## 1 0.25 0.20  
## 2 0.00 0.00  
## 3 0.11 0.01  
## 4 0.00 0.02  
## 5 0.04 0.00  
## 6 0.03 0.07  
## NONCOVID\_21\_71y\_male\_NonICU NONCOVID\_22\_63y\_male\_NonICU  
## 1 0.40 0.30  
## 2 0.00 0.00  
## 3 0.04 0.02  
## 4 0.02 0.02  
## 5 0.00 0.00  
## 6 0.00 0.00  
## NONCOVID\_23\_42y\_female\_NonICU NONCOVID\_24\_32y\_female\_NonICU  
## 1 0.70 0.75  
## 2 0.00 0.00  
## 3 0.02 0.27  
## 4 0.01 0.00  
## 5 0.00 0.06  
## 6 0.00 0.00  
## NONCOVID\_25\_62y\_male\_NonICU NONCOVID\_26\_36y\_male\_ICU  
## 1 2.80 0.22  
## 2 0.00 0.00  
## 3 0.04 0.28  
## 4 0.00 0.00  
## 5 0.00 0.00  
## 6 0.00 0.00

head(the\_matrix)

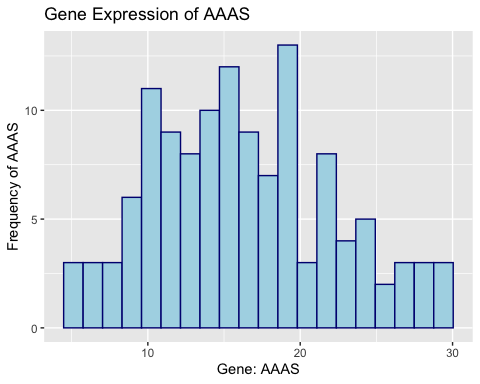
## participant\_id geo\_accession status  
## 1 COVID\_01\_39y\_male\_NonICU GSM4753021 Public on Aug 29 2020  
## 2 COVID\_02\_63y\_male\_NonICU GSM4753022 Public on Aug 29 2020  
## 3 COVID\_03\_33y\_male\_NonICU GSM4753023 Public on Aug 29 2020  
## 4 COVID\_04\_49y\_male\_NonICU GSM4753024 Public on Aug 29 2020  
## 5 COVID\_05\_49y\_male\_NonICU GSM4753025 Public on Aug 29 2020  
## 6 COVID\_06\_:y\_male\_NonICU GSM4753026 Public on Aug 29 2020  
## X.Sample\_submission\_date last\_update\_date type channel\_count  
## 1 Aug 28 2020 Aug 29 2020 SRA 1  
## 2 Aug 28 2020 Aug 29 2020 SRA 1  
## 3 Aug 28 2020 Aug 29 2020 SRA 1  
## 4 Aug 28 2020 Aug 29 2020 SRA 1  
## 5 Aug 28 2020 Aug 29 2020 SRA 1  
## 6 Aug 28 2020 Aug 29 2020 SRA 1  
## source\_name\_ch1 organism\_ch1 disease\_status age sex  
## 1 Leukocytes from whole blood Homo sapiens disease state: COVID-19 39 male  
## 2 Leukocytes from whole blood Homo sapiens disease state: COVID-19 63 male  
## 3 Leukocytes from whole blood Homo sapiens disease state: COVID-19 33 male  
## 4 Leukocytes from whole blood Homo sapiens disease state: COVID-19 49 male  
## 5 Leukocytes from whole blood Homo sapiens disease state: COVID-19 49 male  
## 6 Leukocytes from whole blood Homo sapiens disease state: COVID-19 : male  
## icu\_status apacheii charlson\_score mechanical\_ventilation  
## 1 no 15 0 yes  
## 2 no unknown 2 no  
## 3 no unknown 2 no  
## 4 no unknown 1 no  
## 5 no 19 1 yes  
## 6 no unknown 1 no  
## ventilator.free\_days hospital.free\_days\_post\_45\_day\_followup ferritin.ng.ml.  
## 1 0 0 946  
## 2 28 39 1060  
## 3 28 18 1335  
## 4 28 39 583  
## 5 23 27 800  
## 6 28 36 563  
## crp.mg.l. ddimer.mg.l\_feu. procalcitonin.ng.ml.. lactate.mmol.l. fibrinogen  
## 1 73.1 1.3 36 0.9 513  
## 2 unknown 1.03 0.37 unknown unknown  
## 3 53.2 1.48 0.07 unknown 513  
## 4 251.1 1.32 0.98 0.87 949  
## 5 355.8 0.69 4.92 1.48 929  
## 6 129.1 unknown 0.67 0.86 769  
## sofa  
## 1 8  
## 2 unknown  
## 3 unknown  
## 4 unknown  
## 5 7  
## 6 unknown

#creating a genes data frame for the genes file  
test\_genes <- as.data.frame(t(genes))   
names(test\_genes) <- test\_genes[1,] #this allows the genes table to be organized according to names by adding an extra row with the names  
test\_genes <- test\_genes[-1,] #this removes the first row containing "x" in the genes file so that it can be combined in the next step with the matrix file

test\_genes$participant\_id <- row.names(test\_genes) #this will move the participant id into it's own column in the table  
combined <- merge(test\_genes, the\_matrix, by = 'participant\_id') #this combines the genes file and matrix file together to create one table that I names "combined"

#Histogram using the gene AAAS   
library(ggplot2)  
setwd("/Users/elodierichard/Documents/QBS103/Project Submission 1 Data")  
  
combined$AAAS <- as.numeric(combined$AAAS) #this is so that the plot can pull just the gene AAAS from the combined data in order to plot it  
  
histogram <- ggplot(combined, aes(x=combined$AAAS)) + #this called on ggplot to use the file "combined" then aes was used to plot the x-axis with the gene chosen AAAS  
 geom\_histogram(bins = 20, color = 'navy', fill = 'lightblue') + #this generated the histogram with the number of bars (20), the color and fill of each bar  
 labs(title = 'Gene Expression of AAAS', #this labeled the title and the axis  
 x= 'Gene: AAAS' ,   
 y= 'Frequency of AAAS' )  
plot(histogram)

## Warning: Use of `combined$AAAS` is discouraged.  
## ℹ Use `AAAS` instead.



#Scatterplot of the gene expression of AAAS compared to ferritin levels  
library(ggplot2)  
combined$ferritin.ng.ml. <- as.numeric(combined$ferritin.ng.ml.) #used to pull out ferritin to plot

## Warning: NAs introduced by coercion

#comments mostly the same as for histogram except for a few changes  
scatterplot <- ggplot(combined, aes(x= combined$ferritin.ng.ml., y = combined$AAAS)) + #need to specifiy what is on the y-axis  
 geom\_point(bins = 10, color = 'violet') + #use geom\_point for a scatter plot to be generated  
 labs(title = 'Gene Expression of AAAS vs. Ferritin Levels' ,   
 x= 'Ferritin Levels (ng/mL)',   
 y= 'Gene Expression of AAAS')

## Warning in geom\_point(bins = 10, color = "violet"): Ignoring unknown  
## parameters: `bins`

plot(scatterplot)

## Warning: Use of `combined$ferritin.ng.ml.` is discouraged.  
## ℹ Use `ferritin.ng.ml.` instead.

## Warning: Use of `combined$AAAS` is discouraged.  
## ℹ Use `AAAS` instead.

## Warning: Removed 16 rows containing missing values or values outside the scale range  
## (`geom\_point()`).



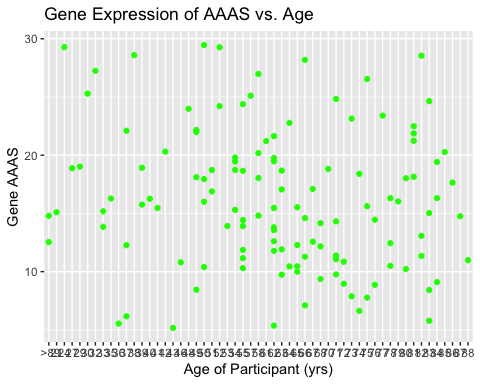
#Scatterplot for Gene Expression vs Age (this was run to compare different data to see differences) not using for presentation  
library(ggplot2)  
  
scatterplot\_practice<- ggplot(combined, aes(x= combined$age, y = combined$AAAS)) +   
 geom\_point(bins = 10, color = 'green') +   
 labs(title = 'Gene Expression of AAAS vs. Age' , x= 'Age of Participant (yrs)', y= 'Gene AAAS')

## Warning in geom\_point(bins = 10, color = "green"): Ignoring unknown parameters:  
## `bins`

plot(scatterplot\_practice)

## Warning: Use of `combined$age` is discouraged.  
## ℹ Use `age` instead.

## Warning: Use of `combined$AAAS` is discouraged.  
## ℹ Use `AAAS` instead.



#Boxplot comparing gene expression of AAAS related to ICU status depending on Age  
library(ggplot2)  
#similar process to histogram and scatterplot with a few adjustments  
boxplot <- ggplot(combined, aes(x=icu\_status, y = AAAS, fill = age)) + #need to add a fill to demonstrate the age range depending on gene expression and if ICU status  
 geom\_boxplot(bins = 10, fill = 'maroon') + #to generate a box plot use geom\_boxplot  
 labs(title = 'Gene Expression of AAAS vs ICU Status and Participant Age', #to label each attribute of the boxplot  
 x= 'ICU Status of Participant' ,   
 y= 'Gene Expression of AAAS',   
 fill= 'Age of Participant (yrs)')

## Warning in geom\_boxplot(bins = 10, fill = "maroon"): Ignoring unknown  
## parameters: `bins`

plot(boxplot)

