4.Data:11,13,13,15,15,16,19,20,20,20,21,21,22,23,24,30,40,45,45,45,71,

72,73,75

a) Smoothing by bin mean

b) Smoothing by bin median

c) Smoothing by bin boundaries

PROGRAM:

ages <- c(13, 15, 16, 16, 19, 20, 20, 21, 22, 22, 25, 25, 25, 25, 30, 33, 33, 35, 35, 35, 35, 36, 40, 45, 46, 52, 70)

mean\_age <- mean(ages)

median\_age <- median(ages)

mode\_age <- as.numeric(names(sort(table(ages), decreasing = TRUE)[1]))

modality <- ifelse(length(unique(table(ages))) == 1, "No mode", paste("Mode(s):", mode\_age))

midrange\_age <- (min(ages) + max(ages)) / 2

Q1 <- quantile(ages, 0.25)

Q3 <- quantile(ages, 0.75)

cat("Mean:", mean\_age, "\n")

cat("Median:", median\_age, "\n")

cat("", modality, "\n")

cat("Midrange:", midrange\_age, "\n")

cat("First Quartile (Q1):", Q1, "\n")

cat("Third Quartile (Q3):", Q3, "\n")

data <- c(200, 300, 400, 600, 1000)

min\_val <- min(data)

max\_val <- max(data)

min\_max\_normalized <- (data - min\_val) / (max\_val - min\_val)

mean\_data <- mean(data)

sd\_data <- sd(data)

z\_score\_normalized <- (data - mean\_data) / sd\_data

cat("Min-Max Normalized Data:", min\_max\_normalized, "\n")

cat("Z-Score Normalized Data:", z\_score\_normalized, "\n")

data\_smooth <- c(11,13,13,15,15,16,19,20,20,20,21,21,22,23,24,30,40,45,45,45,71,72,73,75)

bin\_size <- 6

bins <- split(data\_smooth, ceiling(seq\_along(data\_smooth) / bin\_size))

bin\_means <- sapply(bins, mean)

smooth\_mean <- rep(bin\_means, each=bin\_size, length.out=length(data\_smooth))

bin\_medians <- sapply(bins, median)

smooth\_median <- rep(bin\_medians, each=bin\_size, length.out=length(data\_smooth))

smooth\_boundaries <- unlist(lapply(bins, function(bin) {

lower <- min(bin)

upper <- max(bin)

sapply(bin, function(x) ifelse(abs(x - lower) < abs(x - upper), lower, upper))

}))

cat("Smoothing by Bin Mean:", smooth\_mean, "\n")

cat("Smoothing by Bin Median:", smooth\_median, "\n")

cat("Smoothing by Bin Boundaries:", smooth\_boundaries, "\n")

OUTPUT:

