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Homework 1  
CS 544 - Summer 2025  
6/2/25

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> #Question 1
> temp <- sample(beaver2$temp, 30)
> #Q1A - Display the vector temp
> dput(temp)
c(37.14, 38.04, 38.24, 37.82, 37.89, 38.02, 37.76, 37.86, 37.12,
37.83, 36.89, 37.95, 38.07, 38.17, 37.76, 37.6, 38.11, 37.56,
36.95, 37.17, 37.23, 36.58, 37.12, 38.35, 37, 36.99, 38.03, 37.73,
38.01, 37.51)
> # Q1B - Compute the mean and median of your current temp
> mean(temp)
[1] 37.61667
> median(temp)
[1] 37.76
> # Q1C - Convert temp to integers and find the mode
> temp_int <- as.integer(temp) # truncate decimal values
> temp_int # show the integer vector
[1] 37 38 38 37 37 38 37 37 37 37 36 37 38 38 37 37 38 37 36 37 37 36 37 38
37 36 38 37 38 37
> # Create a frequency table and find the mode
> freq_table <- table(temp_int)
> mode_temp_int <- as.numeric(names(freq_table[freq_table ==
max(freq_table)]))
> mode_temp_int
[1] 37
> # Q1D - Compute variance and standard deviation of temp
> var_temp <- var(temp)
> sd_temp <- sd(temp)
> var_temp
[1] 0.2289402
> sd_temp
[1] 0.478477
> # Q1E - Five-number summary, IQR, and outliers
> # Five-number summary (Min, Q1, Median, Q3, Max)
> summary(temp) # includes Mean too
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  36.58  37.15   37.76   37.62  38.02   38.35
> five_num <- fivenum(temp) # strictly Min, Q1, Median, Q3, Max
> five_num
[1] 36.58 37.14 37.76 38.02 38.35
> #Interquartile Range (IQR = Q3 - Q1)
> iqr_val <- IQR(temp)
> iqr_val
[1] 0.87
> # Outlier thresholds
> Q1 <- five_num[2]
> Q3 <- five_num[4]
> lower_bound <- Q1 - 1.5 * iqr_val
> upper_bound <- Q3 + 1.5 * iqr_val

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> # Identify outliers
> outliers <- temp[temp < lower_bound | temp > upper_bound]
> outliers
numeric(0)
> # Q1F - Compute z-scores of temp
> mean_temp <- mean(temp)
> sd_temp <- sd(temp)
> z_scores <- (temp - mean_temp) / sd_temp
> z_scores
 [1] -0.99621649  0.88475171  1.30274464  0.42495948  0.57125701  0.84295241
[2]  0.29956160  0.50855807 -1.03801578  0.44585913 -1.51870765
[3]  0.69665489  0.94745065  1.15644711  0.29956160 -0.03483274  1.03104923
[4] -0.11843133 -1.39330977 -0.93351755 -0.80811967 -2.16659670
[5] -1.03801578  1.53264075 -1.28881154 -1.30971119  0.86385206  0.23686266
[6]  0.82205277 -0.22292956
> # Q1G - Values less than the first quartile (Q1)
> Q1 <- quantile(temp, 0.25) # get the 1st quartile
> less_than_Q1 <- temp[temp < Q1] # values less than Q1
> Q1
      25%
37.1475
> less_than_Q1
 [1] 37.14 37.12 36.89 36.95 36.58 37.12 37.00 36.99
> # Q1H - Access the first and last elements of temp
> first_value <- temp[1]
> last_value <- temp[length(temp)]
> first_value
 [1] 37.14
> last_value
 [1] 37.51
> # Q1I - Create a 5x6 matrix from temp (fill row-wise)
> temp.matrix <- matrix(temp, nrow = 5, ncol = 6, byrow = TRUE)
> temp.matrix
      [,1] [,2] [,3] [,4] [,5] [,6]
[1,] 37.14 38.04 38.24 37.82 37.89 38.02
[2,] 37.76 37.86 37.12 37.83 36.89 37.95
[3,] 38.07 38.17 37.76 37.60 38.11 37.56
[4,] 36.95 37.17 37.23 36.58 37.12 38.35
[5,] 37.00 36.99 38.03 37.73 38.01 37.51
> # Q1J - Show the first and last columns (works for any matrix size)
> first_col <- temp.matrix[, 1]
> last_col <- temp.matrix[, ncol(temp.matrix)]
> first_col
 [1] 37.14 37.76 38.07 36.95 37.00
> last_col
 [1] 38.02 37.95 37.56 38.35 37.51
> # Q1K - Assign row and column names
> rownames(temp.matrix) <- paste0("Row", 1:nrow(temp.matrix))

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> colnames(temp.matrix) <- paste0("Day", 1:ncol(temp.matrix))
> temp.matrix
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	Day1	Day2	Day3	Day4	Day5	Day6
Row1	37.14	38.04	38.24	37.82	37.89	38.02
Row2	37.76	37.86	37.12	37.83	36.89	37.95
Row3	38.07	38.17	37.76	37.60	38.11	37.56
Row4	36.95	37.17	37.23	36.58	37.12	38.35
Row5	37.00	36.99	38.03	37.73	38.01	37.51