Problem Set 1

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**Question 1**

sample\_1 <- c(3, 4, 5, 6, 7)  
sample\_2 <- c(67, 68, 69, 70, 71)  
  
mean\_samp1 <- sum(sample\_1) / length(sample\_1)  
  
sd\_samp1 <- round(sqrt(((3-mean\_samp1)^2 + (4-mean\_samp1)^2 + (5-mean\_samp1)^2  
 + (6-mean\_samp1)^2 + (7-mean\_samp1)^2) / (length(sample\_1) - 1)), 3)  
  
mean\_samp2 <- sum(sample\_2) / length(sample\_2)  
  
sd\_samp2 <- round(sqrt(((67-mean\_samp2)^2 + (68-mean\_samp2)^2 + (69-mean\_samp2)^2  
 + (70-mean\_samp2)^2 + (71-mean\_samp2)^2) / (length(sample\_2) - 1)), 3)

**Sample 1:**   
- Mean: 5  
- Standard Deviation: 1.581

**Sample 2:**   
-Mean: 69  
-Standard Deviation: 1.581

The standard deviations of sample 1 and sample 2 are equal. This shows that although the samples have different means, they are spread around their center with the same variance.

**Question 2**

z\_tokyo <- (380000 - 420000) / 20000  
  
z\_germany <- (3100 - 3200) / 57

Relative to their peers, the worker in Germany is earning more than the worker in Tokyo. This is demonstrated by the z-score of each worker’s salary. The z-score of the workers’ salaries tells the relative position of their salary to their peers using the mean and standard deviation. In this case, the German worker’s z-score of roughly -1.75 is greater than the Tokyo worker’s z-score of -2, demonstrating that the German worker is earning comparatively more than the Tokyo worker.

**Question 3**

**a)**

z\_prob\_keane <- 1-.192  
z\_keane <- 0.87  
sd\_keane <- (25000 - 21000) / 0.87

Standard Deviation: 4597.7

**b)**

z\_42nd <- -0.2  
percentile\_42 <- (sd\_keane \* z\_42nd) + 21000

42nd Percentile: 20080.46

**c)**

# -1.55 <= z <= 1.55  
percentile\_94 <- (sd\_keane \* 1.55) + 21000  
percentile\_06 <- (sd\_keane \* -1.55) + 21000

Middle 88% values: (13873.56, r format(round(percentile\_94, 2), scientific=FALSE))