# KSU School of Data Science and Analytics Logo STAT 2332- Probability & Data Analysis

# CH 8 Concepts Check Preliminary Tasks

# Instructions

The Chapter 8 Concepts Check covers sections 8.1 – 8.3, but only 8.2 and 8.3 are included on this worksheet. Complete all parts of this worksheet and have it available when you do the Chapter 8 Concepts Check. Have your R scripts for the chapter and this worksheet available, along with any notes you have prepared. While taking the Concepts Check in D2L, you will receive instructions on how to submit your completed worksheet.

# Preliminary R Tasks and Output

## Task 1

*You do not need R for Task 1. Compute the confidence intervals manually or with a calculator.*

There are three main types of exercises: flexibility, strengthening, and endurance. A random sample of people who exercise regularly was obtained. The type of exercise and length (in minutes) of each workout was recorded. The table below summarizes the information obtained.

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| --- | --- | --- | --- |
| Exercise Type | Sample Size | Sample Mean | Assumed σ |
| Flexibility | 55 | 25.2 | 5.2 |
| Strengthening | 36 | 73.6 | 10.7 |
| Endurance | 42 | 82.2 | 12.5 |

Construct a 99% confidence interval for the mean workout length for each of the three types of exercises. Complete all rows of the table.

|  |  |  |
| --- | --- | --- |
| **Exercise Type** | **Confidence Interval** | **Interpretation** |
| *Flexibility* | (23.56884, 26.83116) | 99% confident all flexibility workouts are between 23.57 minutes and 26.83 minutes. |
| *Strengthening* | (69.45135, 77.74865) | 99% confident all strengthening workouts are between 69.45 minutes and 77.75 minutes. |
| *Endurance* | (77.71296, 86.68704) | 99% confident all endurance workouts are between 77.71 minutes and 86.69 minutes. |

## Task 2

Researchers have discovered a new method for increasing the efficiency of solar panels. A new antireflective coating allows a panel to absorb more sunlight from any angle. A random sample of solar panels was obtained, and each was treated with the new coating. The rate of sunlight absorbed (as a percentage) was measured for each panel.

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| **Rate of Absorption (percent)** |
| 98.23 95.29 98.52 94.29 97.12 89.58  93.80 95.07 96.81 89.71 95.88 96.93 |

In R, generate a histogram, boxplot and normal probability plot for the data. Paste your R code for all three plots in the space below.

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| AbsorptionRate <- c(98.23, 95.29, 98.52, 94.29, 97.12, 89.58, 93.80, 95.07, 96.81, 89.71, 95.88, 96.93)  hist(AbsorptionRate) # histogram  boxplot(AbsorptionRate) # boxplot  # normal probability plot  qqnorm(AbsorptionRate)  qqline(AbsorptionRate) |

Paste the plots on the appropriate row.

| *Type* | *Paste your plot below. Resize it to fit.* |
| --- | --- |
| *Histogram* |  |
| *Boxplot* |  |
| *Normal probability plot* |  |

In R, generate the 93% confidence interval for the true mean rate of sunlight absorbed for treated solar panels. Paste your R code in the space provided.

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| # 93% confidence interval  z <- qnorm(1-((1-0.93)/2)) # gives us z-score  mean <- mean(AbsorptionRate)  n <- length(AbsorptionRate)  sd <- (sd(AbsorptionRate)/sqrt(n))  errormargin <- (z\*sd) # calculate margin of error  # calculate bounds  low <- mean - errormargin  high <- mean + errormargin  low  high |

Write the interpretation of 93% confidence interval for the true mean rate of sunlight absorbed in the space provided.

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| values for true mean are between 93.57077 and 96.63445. Mean falls in interval |