Tasks 07-01 - Descriptive Statistics

Section 07: Probability & Statistics

Problem 1: Measures of Central Tendency (x)

For the dataset: $15, 22, 18, 25, 22, 19, 22, 28, 17, 22$

a) Calculate the mean.
b) Find the median.
c) Find the mode.
d) Which measure best represents the “typical” value? Why?

Problem 2: Variance and Standard Deviation (x)

For the dataset: $8, 12, 15, 11, 14$

a) Calculate the mean.
b) Calculate the sample variance.
c) Calculate the sample standard deviation.

Problem 3: Range and IQR (x)

For the dataset: $42, 55, 63, 48, 71, 59, 45, 67, 52, 58, 61, 49$

a) Find the range.
b) Find Q1 (first quartile).
c) Find Q3 (third quartile).
d) Calculate the interquartile range (IQR).

Problem 4: Outlier Detection (xx)

For the dataset: $25, 28, 30, 32, 27, 29, 31, 85, 26, 30$

a) Calculate Q1, Q3, and IQR.
b) Determine the lower and upper fences for outliers.
c) Are there any outliers? If so, which value(s)?
d) Recalculate the mean with and without outliers.

Problem 5: Frequency Distribution (x)

Test scores for 20 students:
$65, 72, 78, 85, 91, 68, 74, 82, 88, 95, 71, 77, 83, 89, 73, 79, 84, 92, 76, 81$

a) Create a frequency table using intervals: 65-74, 75-84, 85-94, 95-100
b) Calculate the relative frequency for each interval.
c) What percentage of students scored between 75 and 84?

Problem 6: Comparing Datasets (xx)

Two sales teams' weekly sales (in units):

Team A: $45, 52, 48, 55, 50$ Team B: $30, 70, 45, 60, 45$

a) Calculate the mean for each team.
b) Calculate the standard deviation for each team.
c) Which team is more consistent? Why?
d) Which team would you prefer to manage? Justify your answer.

Problem 7: Five-Number Summary (xx)

Monthly revenue data (in thousands Euro):
$120, 145, 132, 158, 175, 142, 138, 165, 155, 148, 162, 170$

a) Find the five-number summary (Min, Q1, Median, Q3, Max).
b) Calculate the IQR.
c) Describe the shape of the distribution based on the five-number summary.

Problem 8: Grouped Data (xxx)

Employee salaries (in thousands Euro) at a company are grouped:

Salary Range	Frequency
30-39	8
40-49	15
50-59	22
60-69	12
70-79	3

a) Estimate the mean salary using midpoints.
b) Find the modal class.
c) Estimate the median class.
d) Calculate the relative frequency for each class.

Problem 9: Business Application (xx)

A quality control manager measures the diameter of manufactured bolts (in mm):

$10.02, 9.98, 10.05, 9.97, 10.01, 10.03, 9.99, 10.02, 10.00, 9.96, 10.04, 10.01$

Target diameter: 10.00 mm with tolerance ±0.05 mm

a) Calculate the mean diameter.
b) Calculate the standard deviation.
c) Are all bolts within specification?
d) If bolts outside tolerance are rejected, what is the reject rate?

Problem 10: Coefficient of Variation (xx)

Compare the variability of these two datasets using the coefficient of variation:

Dataset X (prices in Euro): $50, 55, 45, 60, 40$ Dataset Y (prices in cents): $5000, 5500, 4500, 6000, 4000$

a) Calculate mean and standard deviation for both datasets.
b) Calculate the coefficient of variation (CV = s/mean × 100%) for both.
c) Which dataset has more relative variability?

Problem 11: Percentiles (xxx)

For the dataset: $12, 15, 18, 22, 25, 28, 31, 35, 38, 42, 45, 48, 52, 55, 58, 62, 65, 68, 72, 75$

a) Find the 25th percentile (P25).
b) Find the 75th percentile (P75).
c) Find the 90th percentile (P90).
d) If a value is at the 60th percentile, how many values are below it?

Problem 12: Comprehensive Analysis (xxxx)

A store tracks daily customer counts for 30 days:

$42, 58, 65, 38, 71, 45, 52, 67, 55, 48, 63, 72, 44, 59, 68, 51, 56, 74, 41, 62, 49, 57, 69, 46, 54, 70, 43, 60, 66, 50$

a) Calculate all measures of central tendency (mean, median, mode).
b) Calculate range, variance, standard deviation, and IQR.
c) Construct the five-number summary.
d) Identify any outliers using the 1.5 × IQR rule.
e) Create a frequency distribution with 5 equal-width classes.
f) What can you conclude about the store's daily customer traffic?