Table of Contents


```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% ENGR 132
% Program Description
%   ...
%
% Assigment Information
%   Assignment:       PS 03, Problem 2
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%   Team ID:            005-12
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

INTITIALIZATION

```
data_powder = csvread('Data_metalpowder.csv',2);
powder1 = data_powder([1:106],1);
powder2 = data_powder([1:106],2);
```

STATISTICS & FORMATTED DISPLAY

a. Calculate the descriptive statistics for each powder sample: minimum, maximum, range, mean, median, and standard deviation.

```
mean_146 = mean(powder1);
median_146 = median(powder1);
```

```
max_146 = max(powder1);
min_146 = min(powder1);
range_146 = range(powder1);
std_146 = std(powder1);

mean_172 = mean(powder2);
median_172 = median(powder2);
max_172 = max(powder2);
min_172 = min(powder2);
range_172 = range(powder2);
std_172 = std(powder2);

% b. Use print commands to display all of the descriptive statistics
 to the Command Window.
fprintf('Powder 146 mean = %.2f\n', mean_146);
fprintf('Powder 146 median = %.2f\n', median_146);
fprintf('Powder 146 range = %.2f\n', range_146);
fprintf('Powder 146 max = %.2f\n', max_146);
fprintf('Powder 146 min = %.2f\n', min_146);
fprintf('Powder 146 standard deviation = %.2f\n', std_146);

fprintf('Powder 172 mean = %.2f\n', mean_172);
fprintf('Powder 172 median = %.2f\n', median_172);
fprintf('Powder 172 range = %.2f\n', range_172);
fprintf('Powder 172 max = %.2f\n', max_172);
fprintf('Powder 172 min = %.2f\n', min_172);
fprintf('Powder 172 standard deviation = %.2f\n', std_172);
```

```
Powder 146 mean = 39.94
Powder 146 median = 38.00
Powder 146 range = 82.00
Powder 146 max = 90.00
Powder 146 min = 8.00
Powder 146 standard deviation = 15.39
Powder 172 mean = 41.41
Powder 172 median = 40.00
Powder 172 range = 78.00
Powder 172 max = 85.00
Powder 172 min = 7.00
Powder 172 standard deviation = 15.49
```

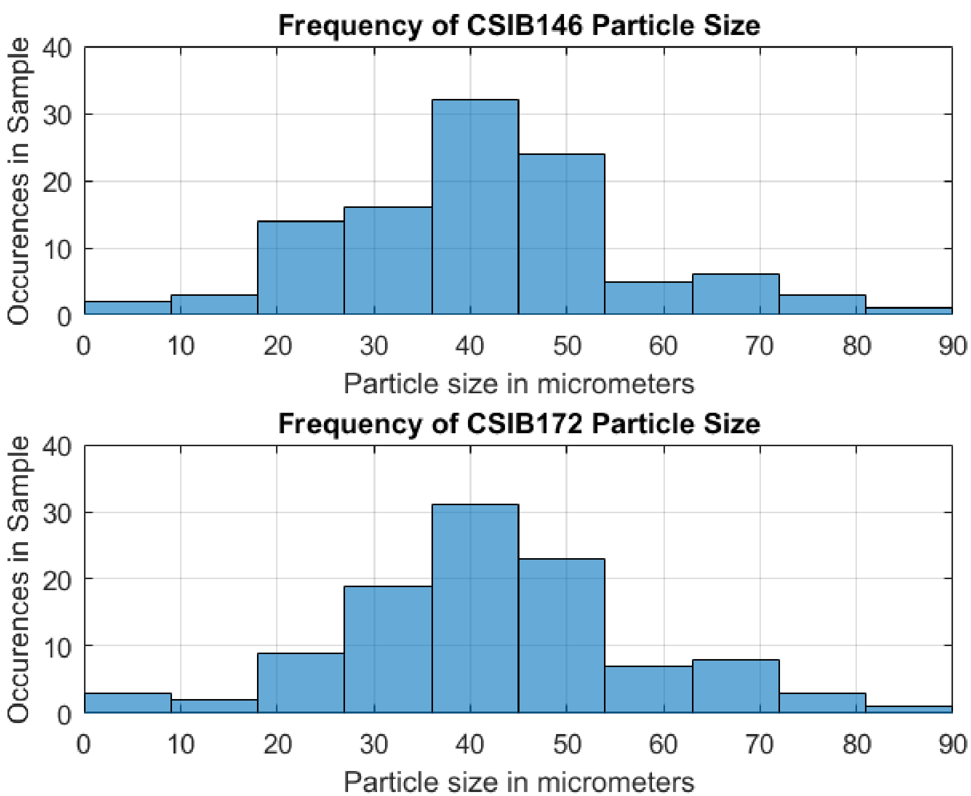
HISTOGRAMS

a. Create a 2x1 (row x col) subplot with two histograms. Each histogram in the subplot should have the same number of bins and edges, which must be managed appropriately so the histograms can be used for meaningful comparisons. i. The top histogram will be the particle size distribution for CSIB-146.

```
subplot(2,1,1)
powder1hist = histogram(powder1);
powder1hist.BinLimits = [0 90];
powder1hist.BinWidth = 9;
```

```
xlabel('Particle size in micrometers');
ylabel('Occurences in Sample');
title('Frequency of CSIB146 Particle Size');
grid on;

%ii. The bottom histogram will be the particle size distribution for
 CSIB-172.
subplot(2,1,2)
powder2hist = histogram(powder2);
powder2hist.BinLimits = [0 90];
powder2hist.BinWidth = 9;
xlabel('Particle size in micrometers');
ylabel('Occurences in Sample');
title('Frequency of CSIB172 Particle Size');
grid on;
```



CALCULATIONS & FORMATTED DISPLAY

i. The percent of particles that are outside the required size range. See the hint in Step 5.a. Note: Do not report percentage as a decimal, e.g. 0.12; instead say 12%.

```
percent_172 = (powder2hist.Values(1,1) + powder2hist.Values(1,10)) /
 106 * 100;
```

```
percent_146 = (powder1hist.Values(1,1) + powder1hist.Values(1,10)) /
 106 * 100;

% ii. The difference between the sample median and sample mean and
 whether the mean
% is greater than the median or less than the median.
mean_dif146 = mean_146 - median_146;
mean_dif172 = mean_172 - median_172;

% iii. The difference between the sample mean and the baseline mean.
mean_baseDif146 = 41.5 - mean_146;
mean_baseDif172 = 41.5 - mean_172;

% b. For both samples, print the results of the above calculations to
 the Command Window.
fprintf('Percent of particles outside size range (CSIB146) = %.2f\n',
 percent_146)
fprintf('Percent of particles outside size range (CSIB172) = %.2f\n',
 percent_172)

fprintf('Difference between sample median and sample mean (CSIB146) =
 %.2f\n', mean_dif146)
fprintf('Difference between sample median and sample mean (CSIB172) =
 %.2f\n', mean_dif172)

fprintf('Difference between baseline mean and sample mean (CSIB146) =
 %.2f\n', mean_baseDif146)
fprintf('Difference between baseline mean and sample mean (CSIB172) =
 %.2f\n', mean_baseDif172)
```

```
Percent of particles outside size range (CSIB146) = 2.83
Percent of particles outside size range (CSIB172) = 3.77
Difference between sample median and sample mean (CSIB146) = 1.94
Difference between sample median and sample mean (CSIB172) = 1.41
Difference between baseline mean and sample mean (CSIB146) = 1.56
Difference between baseline mean and sample mean (CSIB172) = 0.09
```

ANALYSIS

--- Q1

Q1: Are the particle size distributions of the samples similar or different? Justify your answer by comparing the two histograms, making reference to the shape and skew of the distributions.

```
% The sample size distributions are very similar, the only difference
% showing up in the number of particles outside of the desired range.
 Both
% of their graphs represent a unimodial trend, with a peak at a size
 around
% 40 micrometers.
```

--- Q2

Q2: Is the powder meeting the quality control requirements? Justify your answer based on the powder specifications provided above.

```
% The powder is meeting the quality control requirements because the
% percent of particles outside the size range is under 8%, and the
% difference between sample median and sample mean, and the difference
% between baseline mean and sample mean, are both under the regulation
 of
% 2.5%.
```

ACADEMIC INTEGRITY STATEMENT

I/We have not used source code obtained from any other unauthorized source, either modified or unmodified. Neither have I/we provided access to my/our code to another. The project I/we am/are submitting is my/our own original work.

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