Chapter 7 HW

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ENGI-111-01

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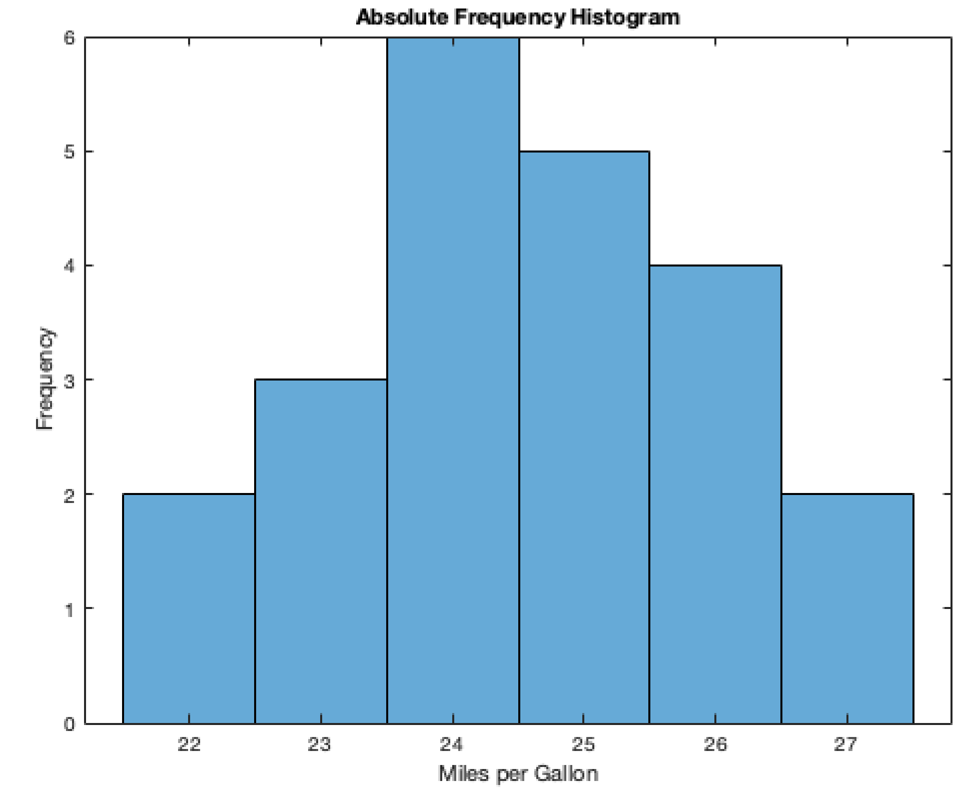
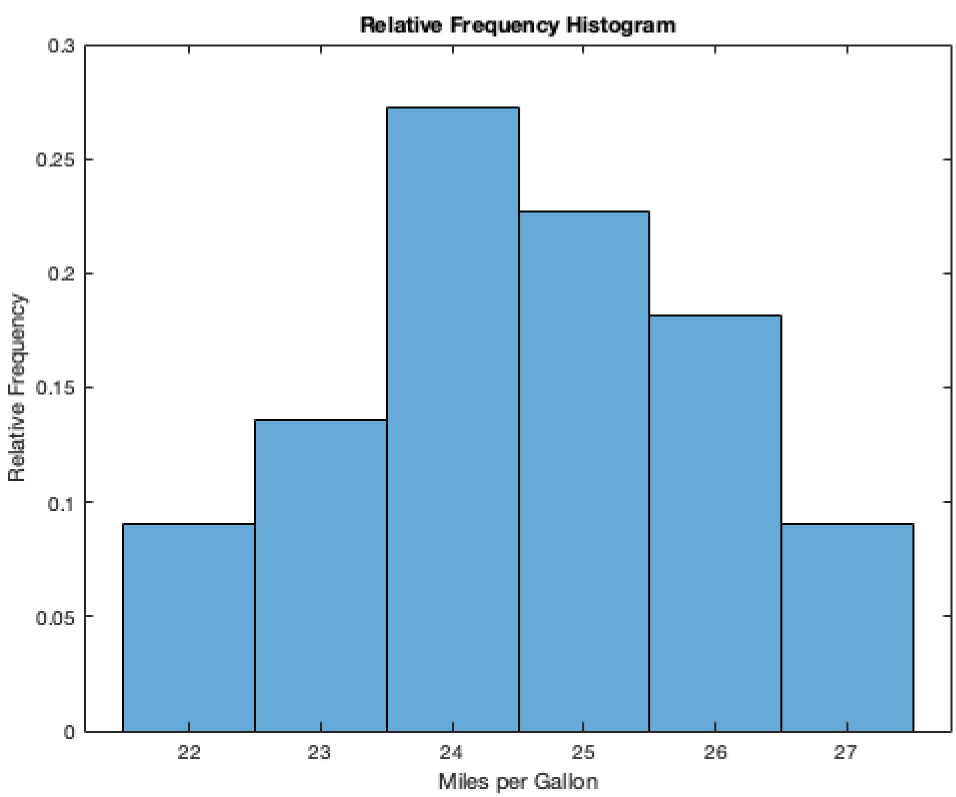
16 April 2024

Problem 1

```
data = [23, 25, 26, 25, 27, 25, 24, 22, 23, 25, 26, 26, 24, 24, 22, 25, 26,
24, 24, 24, 27, 23];

% absolute frequency histogram
figure;
histogram(data, 'BinMethod', 'integers', 'Normalization', 'count');
title('Absolute Frequency Histogram');
xlabel('Miles per Gallon');
ylabel('Frequency');

% relative frequency histogram
figure;
histogram(data, 'BinMethod', 'integers', 'Normalization', 'probability');
title('Relative Frequency Histogram');
xlabel('Miles per Gallon');
ylabel('Relative Frequency');
```

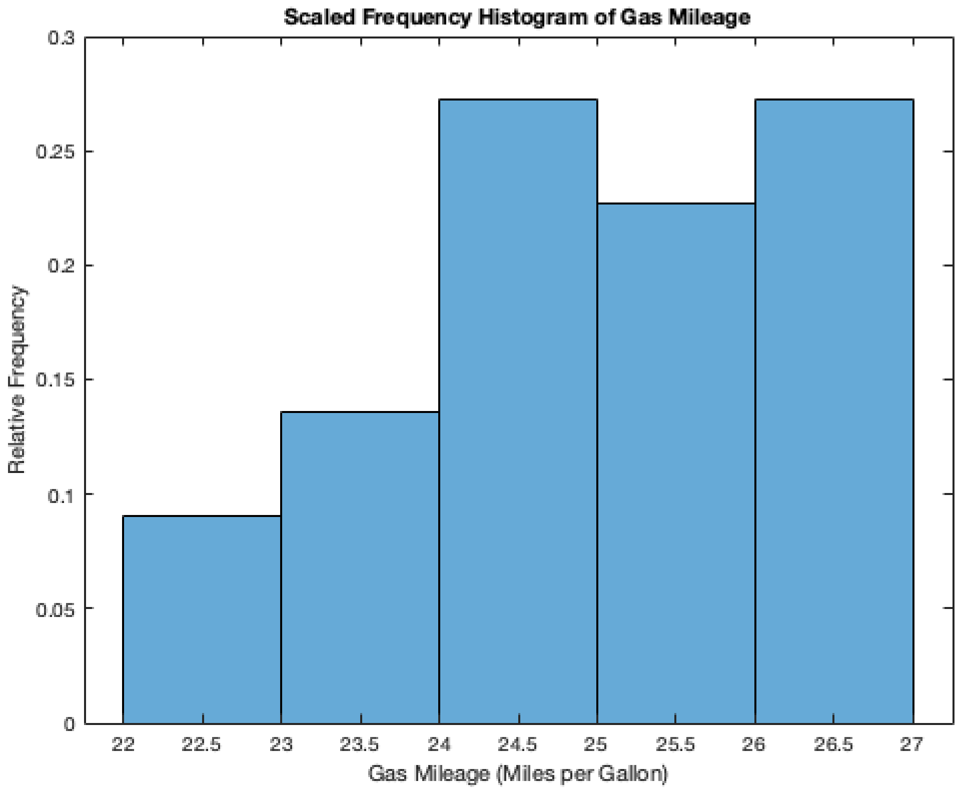

Absolute Frequency Histogram
Frequency
Miles per Gallon
0
1
2
3
4
5
6
22
23
24
25
26
27


Relative Frequency Histogram
Relative Frequency
Miles per Gallon
0
0.05
0.1
0.15
0.2
0.25
0.3
22
23
24
25
26
27

Problem 6

```
% a. scaled frequency histogram
histogram(data, 'BinWidth', 1, 'Normalization', 'probability');
xlabel('Gas Mileage (Miles per Gallon)');
ylabel('Relative Frequency');
title('Scaled Frequency Histogram of Gas Mileage');

% b. mean and standard deviation
mean_mileage = mean(data);
std_mileage = std(data);

% 68% is within one standard deviation of the mean
lower_limit = mean_mileage - std_mileage;
upper_limit = mean_mileage + std_mileage;

% compare with actual data
data_min = min(data);
data_max = max(data);

fprintf('Lower limit estimated from mean and standard deviation = %.2f\n',
lower_limit);
fprintf('Upper limit estimated from mean and standard deviation = %.2f\n',
upper_limit);
fprintf('Actual lower limit of the data = %d\n', data_min);
fprintf('Actual upper limit of the data = %d\n', data_max);
```

```
Lower limit estimated from mean and standard deviation = 23.11
Upper limit estimated from mean and standard deviation = 25.98
Actual lower limit of the data = 22
Actual upper limit of the data = 27
```



Problem 11

```
mu = 9.004;
sigma = 0.003;
tolerance = 0.01;

% upper and lower bounds
lower_bound = 9 - tolerance;
upper_bound = 9 + tolerance;

% cumulative distribution probability for upper and lower bounds
prob_lower = normcdf(lower_bound, mu, sigma);
prob_upper = normcdf(upper_bound, mu, sigma);

% percentage of fittings is difference between probabilities of upper and
lower bounds
percentage_within_tolerance = (prob_upper - prob_lower) * 100;

% result
fprintf('The percentage of fittings within tolerance is approximately %.2f%%
\n', percentage_within_tolerance);
```

The percentage of fittings within tolerance is approximately 97.72%

Problem 14

```
% a. mean and variance of length

% mean length
mu1 = 1;
mu2 = 2.5;
mu3 = 3;
mu_assembled = mu1 + mu2 + mu3;
disp(['Mean length of assembled product: ', num2str(mu_assembled), ' ft']);

% variance
var1 = 0.00014;
var2 = 0.0002;
var3 = 0.0003;
var_assembled = var1 + var2 + var3;
disp(['Variance of length of assembled product: ', num2str(var_assembled), '
ft^2']);

% b. percentage
lower_bound = 6.48;
upper_bound = 6.52;

% standardize
z_lower = (lower_bound - mu_assembled) / sqrt(var_assembled);
z_upper = (upper_bound - mu_assembled) / sqrt(var_assembled);

% probability
probability_within_range = normcdf(z_upper) - normcdf(z_lower);

% probability to percentage
percentage_within_range = probability_within_range * 100;
disp(['Percentage of assembled products within the specified range: ',
num2str(percentage_within_range), '%']);
```

```
Mean length of assembled product: 6.5 ft
Variance of length of assembled product: 0.00064 ft^2
Percentage of assembled products within the specified range: 57.0805%
```

Problem 19

```
% 100 trials
x100 = sqrt(5) * randn(1,100);
y100 = x100.*x100;
mean100 = mean(y100)
variance100 = var(y100)

% 1000 trials
x1000 = sqrt(5) * randn(1,1000);
y1000 = x1000.*x1000;
mean1000 = mean(y1000)
variance1000 = var(y1000)
```

```
% 5000 trials
x5000 = sqrt(5) * randn(1,5000);
y5000 = x5000.*x5000;
mean5000 = mean(y5000)
variance5000 = var(y5000)
```

```
mean100 =

    4.7697


variance100 =

   40.5514


mean1000 =

    4.9372


variance1000 =

   43.4427


mean5000 =

    4.6694


variance5000 =

   41.7798
```

Problem 26

```
% time with T(5) and T(9) missing and temp
time = [1:4 6:8 10:12];
temp = [10 9 18 24 21 20 18 15 13 11];

interp1(time, temp, [5 9])
```

```
ans =

   22.5000   16.5000
```

Published with MATLAB® R2023b