1. (30 pts.) The miles per gallon (mpg) for each of 20 medium-sized cars selected from a production line during the month of March follow.

23,1	21,3	23,6	23,7
20,2	24,4	25,3	27,0
24,7	22,7	26,2	23,2
25,9	24,7	24,4	24,2
24,9	22,2	22,9	24,6

a. What are the maximum and minimum miles per gallon? What is the range?

b. Construct a relative frequency histogram for these data. How would you describe the shape of the distribution?

c. Find the mean and the standard deviation.

d. Arrange the data from smallest to largest. Find the z-scores for the largest and smallest observations. Would you consider them to be outliers? Why or why not?

e. What is the median?

f. Find the lower and upper quartiles.

```
*Histogram_Reactor by Mehmet Akif KOZ 192010010023
*This program:
        a. Calculates maximum and minimum values of a data set. Calculates the range.
        b. Constructs a relative frequency histogram for a data set.
        c. Finds the mean and the standard deviation.
        d. Arranges the data from smallest to largest.
           Finds the z-scores for the largest and smallest observations. Determines whether they are outliers or not and proves it.
        e. Calculates the median.
        f. Finds the lower and upper quartiles.
*Instructions: Put the data values in the "numbers" array before running the program. Then enter the class width and starting value.

********************************************************************************************************************************************************
a.
MIN = 20.20
MAX = 27.00
RANGE = 6.80


********************************************************************************************************************************************************
b.
CLASS WIDTH = 0.4
STARTING = 20.20
NUMBER OF CLASSES = 18

CLASSES         FREQ.   REL. FREQ.      CLASS MIDPOINT          REL. FREQ. HISTOGRAM
20.20 - 20.60   1       0.05            20.40                   ------
20.60 - 21.00   0       0.00            20.80
21.00 - 21.40   1       0.05            21.20                   ------
21.40 - 21.80   0       0.00            21.60
21.80 - 22.20   0       0.00            22.00
22.20 - 22.60   1       0.05            22.40                   ------
22.60 - 23.00   2       0.10            22.80                   -----------
23.00 - 23.40   2       0.10            23.20                   -----------
23.40 - 23.80   2       0.10            23.60                   -----------
23.80 - 24.20   0       0.00            24.00
24.20 - 24.60   3       0.15            24.40                   ---------------
24.60 - 25.00   4       0.20            24.80                   --------------------
25.00 - 25.40   1       0.05            25.20                   ------
25.40 - 25.80   0       0.00            25.60
25.80 - 26.20   1       0.05            26.00                   ------
26.20 - 26.60   1       0.05            26.40                   ------
26.60 - 27.00   0       0.00            26.80
27.00 - 27.40   1       0.05            27.20                   ------

********************************************************************************************************************************************************
c.
MEAN = 23.96
STANDARD DEVIATION = 1.641373

********************************************************************************************************************************************************
d.

20.20   21.30   22.20   22.70   22.90   23.10   23.20   23.60   23.70   24.20   24.40   24.40   24.60   24.70   24.70   24.90   25.30   25.90   26.20   27.00

Z-SCORE FOR THE LARGEST OBSERVATION = 1.852108
27.00 IS INSIDE OF THE RANGE [19.90 ,27.90] THEREFORE IT IS NOT AN OUTLIER.
Z-SCORE FOR THE SMALLEST OBSERVATION = -2.290765
20.20 IS INSIDE OF THE RANGE [19.90 ,27.90] THEREFORE IT IS NOT AN OUTLIER.

QUARTILE1 (Q1) = 22.90
QUARTILE1 (Q2) = 24.30
QUARTILE1 (Q3) = 24.90

INTERQUARTILE RANGE(IQR): Q3-Q1
                        MIDDLE 50% OF DATA

OUTLIER
1. FIND IQR ------------> 24.90 - 22.90 = 2.00
2. (1.5) * (IQR) -------> (1.5) * (2.00) = 3.00
3. Q1 - (1.5) * (IQR) --> 22.90 - (1.5) * (2.00) = 19.90
4. Q3 + (1.5) * (IQR) --> 24.90 + (1.5) * (2.00) = 27.90
5. IF THE VARIABLE IS OUTSIDE OF THE RANGE [Q1 - (1.5) * (IQR) , Q3 + (1.5) * (IQR)] IT IS AN OUTLIER.

********************************************************************************************************************************************************
e.
MEDIAN = 24.30

********************************************************************************************************************************************************
f.
LOWER QUARTILE = 22.90
UPPER QUARTILE = 24.90

Press any key to continue.
```