1. **Problem**
   A continuous random variable was measured 200 times. The resulting frequency distribution is shown below.

class	frequency
10–20	58
20–30	12
30–40	11
40–50	8
50–60	11
60–70	10
70–80	9
80–90	9
90–100	12
100–110	25
110–120	35

   (a) Describe the overall shape of the distribution. (symmetric mound, skew left, skew right, uniform, or bimodal)

   (b) Estimate the range of the distribution (range = max-min).

   (c) What percent of the measurements are greater than 60?

   (d) What percent of the measurements are less than 90?

   (e) What percent of the measurements are between 60 and 90?

   (f) What percent of the measurements are within 10 of 50? In other words, what percent of measurements satisfy $|x - 50| \leq 10$?

   (g) Of the measurements greater than 60, what percent are less than 90?

   (h) Estimate the value of the 59.5th percentile. In other words, determine a value such that 59.5% of the measurements are less than or equal to it.

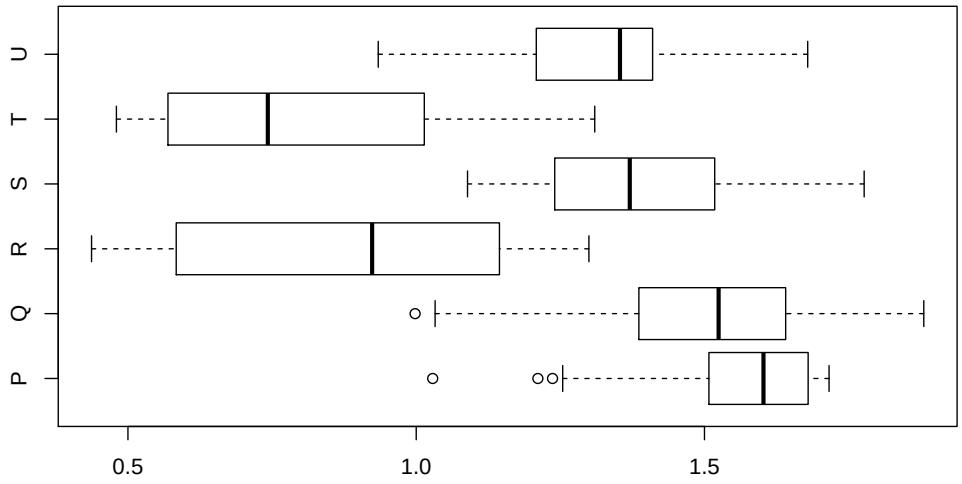
2. **Problem**
   From a very large population, a small sample of measurements was taken.

130	119	127	117	115	121

   Please calculate the Average Absolute Deviation (also called the Average Distance from Mean: ADM) using the following formula:

$$\text{AAD} = \frac{\sum |x - \bar{x}|}{n}$$

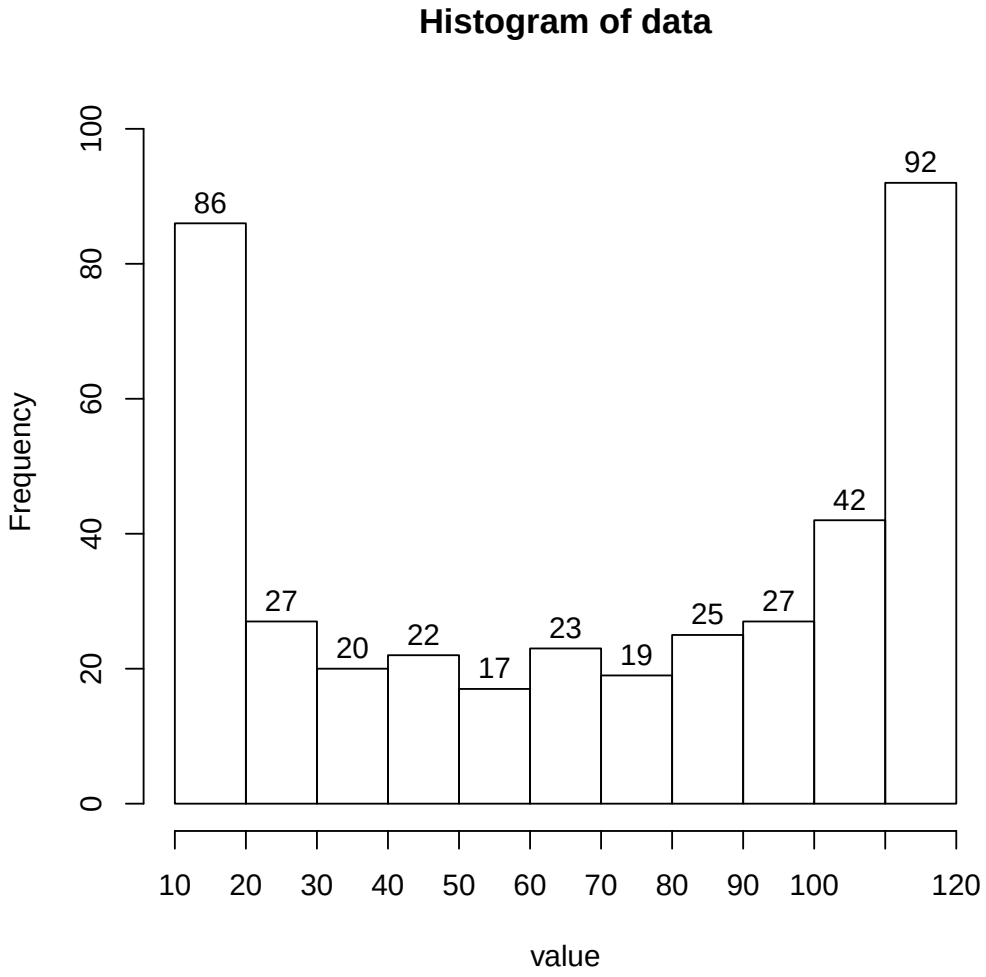
3. **Problem**
Six random variables were each measured 25 times. The resulting boxplots are shown.



.image

(a) Which variable produced the largest measurment?
(b) Which variable produced the smallest measurment?
(c) Which distribution has the largest median?
(d) Which distribution has the smallest median?
(e) Which distribution has the largest 25th percentile?
(f) Which distribution has the smallest 25th percentile?
(g) Which distribution has the largest 75th percentile?
(h) Which distribution has the smallest 75th percentile?
(i) Which distribution has the largest IQR?
(j) Which distribution has the smallest IQR?

4. **Problem**
A continuous random variable was measured 400 times. The resulting histogram is shown below.



(a) Describe the overall shape of the distribution. (symmetric mound, skew left, skew right, uniform, or bimodal)

(b) Estimate the range of the distribution (range = max-min).

(c) What percent of the measurements are less than 40?

(d) What percent of the measurements are greater than 20?

(e) What percent of the measurements are between 20 and 40?

(f) What percent of the measurements are within 25 from 55? In other words, what percent of measurements satisfy $|x - 55| \leq 25$?

(g) Of the measurements less than 40, what percent are greater than 20?

(h) Estimate the value of the 43th percentile. In other words, determine a value such that 43% of the measurements are less than or equal to it.

5. **Problem**
   From a very large population, a small sample of measurements was taken.

86	90	90	90

   Please calculate the (Bessel corrected) sample standard deviation using the following formula:

$$s = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}$$

6. **Problem**
   Please make a frequency table and a dot plot from the following (unsorted) data.

18	21	22	23	21	19
18	18	22	24	23	24
18	23	18	19	24	20
20	23	17	19	19	20
19	17	17	19	20	18

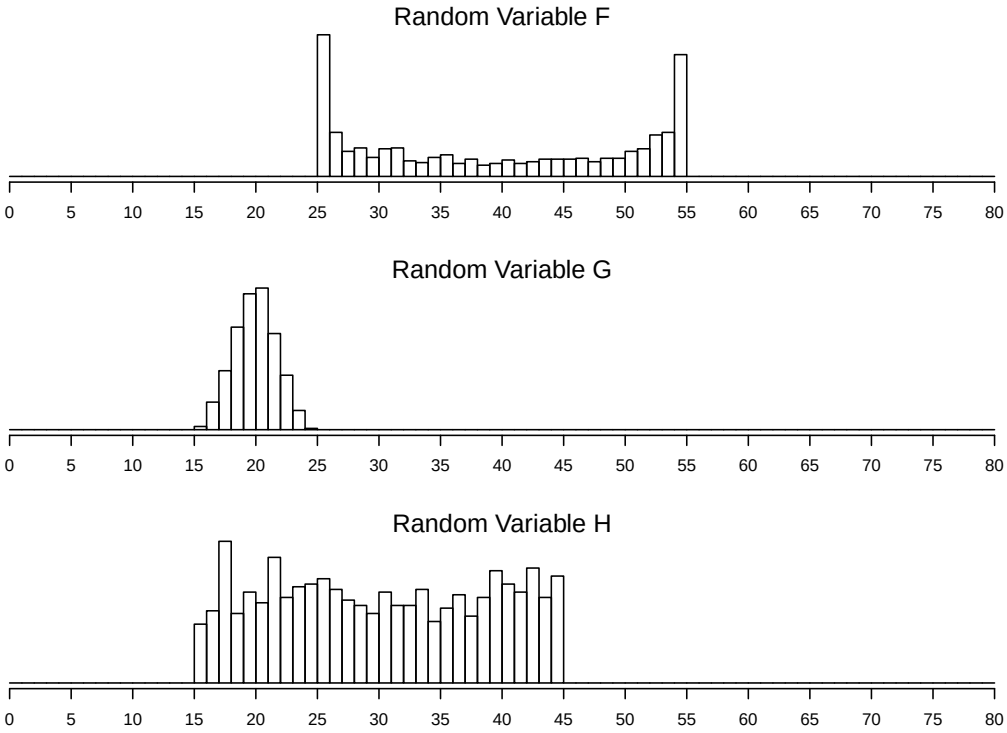
7. **Problem**
We can estimate the mean of **symmetric** distributions.

$$\bar{x} \approx \frac{\max(x) + \min(x)}{2}$$

We can **roughly** estimate the standard deviation of certain distributions.

Shape	SD estimate
bell	range/6
uniform	range/4
bimodal	range/2

Three random variables (F, G, and H) were measured 1000 times each. The resulting histograms show the three distributions.



(a) Estimate the mean of F.

(b) Estimate the mean of G.

(c) Estimate the mean of H.

(d) Estimate the standard deviation of F.

(e) Estimate the standard deviation of G.

(f) Estimate the standard deviation of H.

8. **Problem**
A continuous random variable X was measured 14 times. The sorted measurements are shown below.

30.1	30.48	31.44	32.39	32.43	32.69	32.76	33.02	33.29	33.64
34.04	34.43	34.86	34.93						

The total of the measurements is 460.5.

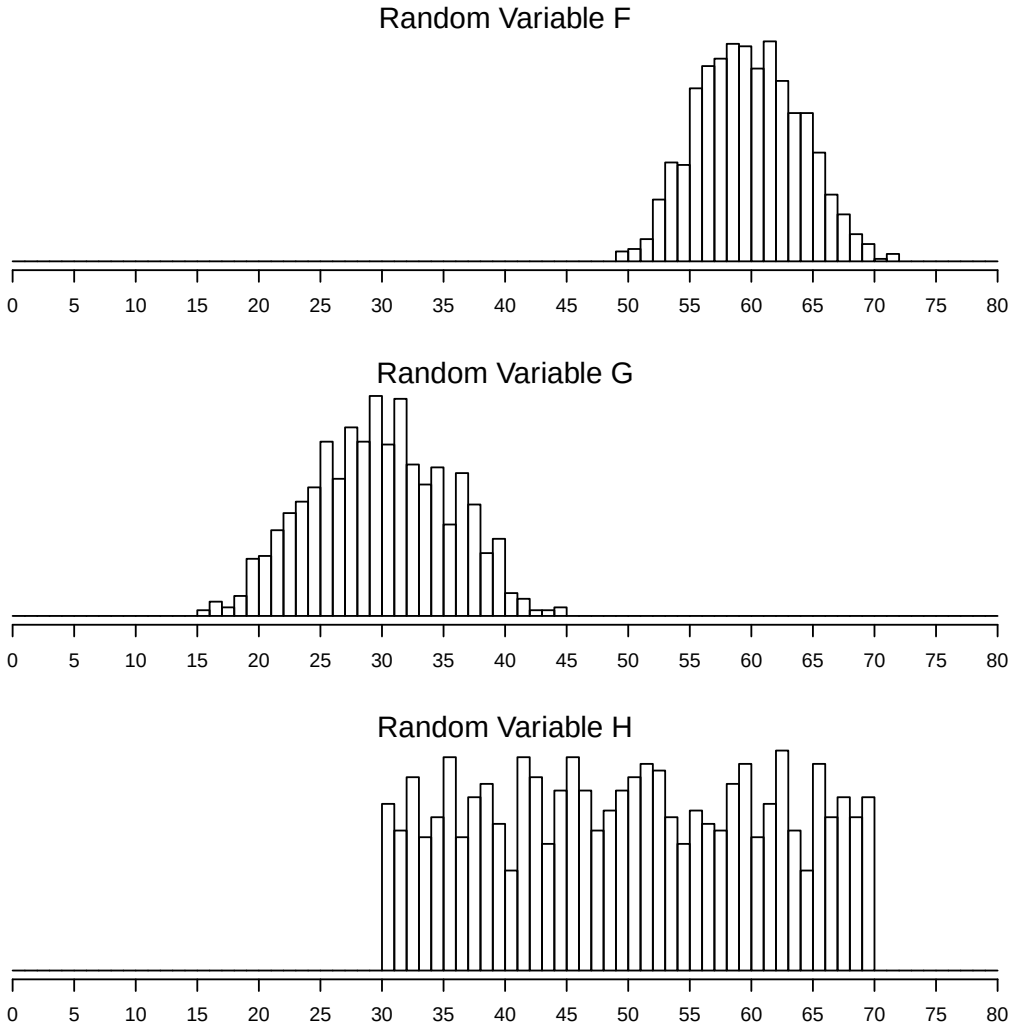
(a) Determine the percentile rank of the measurement 34.43. In other words, determine what percent of data are less than or equal to 34.43.

(b) Determine the measurement corresponding to a percentile rank of 0.357. In other words, determine x such that 35.7% of the data are less than or equal to x.

(c) Determine the mean of the measurements.

(d) Determine the median of the measurements.

9. **Problem**
Three random variables (F, G, and H) were measured 1000 times each. The resulting histograms show the three distributions.



(a) Which distribution has the highest mean? (F, G, or H)

(b) Which distribution has the lowest mean? (F, G, or H)

(c) Which distribution has the largest standard deviation? (F, G, or H)

(d) Which distribution has the smallest standard deviation? (F, G, or H)