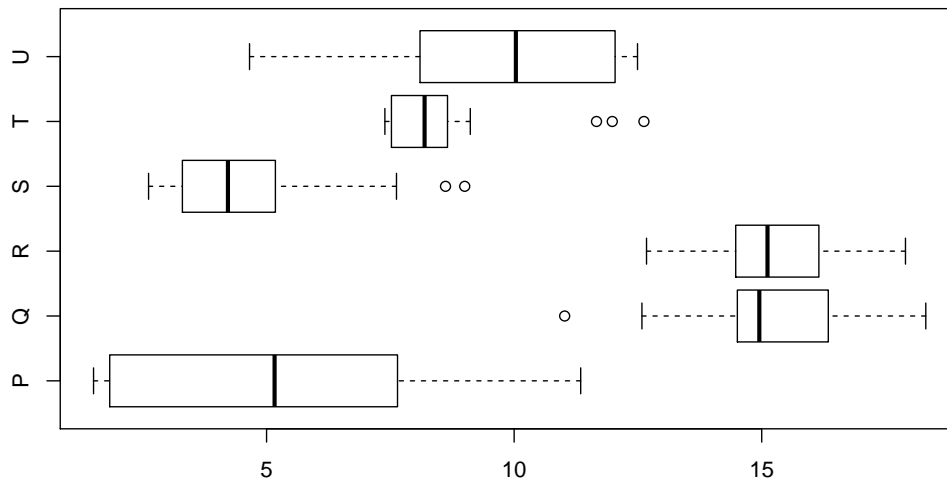1. **Problem**
   Six random variables were each measured 25 times. The resulting boxplots are shown.

(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?

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

157	161	169	145

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

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

3. **Problem**

A continuous random variable was measured 100 times. The resulting frequency distribution is shown below.

class	frequency
48–50	8
50–52	9
52–54	10
54–56	12
56–58	10
58–60	15
60–62	12
62–64	6
64–66	9
66–68	9

(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 54?

(d) What percent of the measurements are greater than 50?

(e) What percent of the measurements are between 50 and 54?

(f) What percent of the measurements are within 4 of 58? In other words, what percent of measurements satisfy $|x - 58| \leq 4$?

(g) Of the measurements less than 54, what percent are greater than 50?

(h) Estimate the value of the 64th percentile. In other words, determine a value such that 64% of the measurements are less than or equal to it.

4. **Problem**

A continuous random variable X was measured 44 times. The sorted measurements are shown below.

80.04	80.06	80.07	80.07	80.09	80.24	80.25	80.33	80.34	80.38
80.4	80.49	80.65	80.72	80.76	80.78	80.93	80.97	81.04	81.06
81.11	81.27	81.28	81.28	81.47	81.54	81.58	81.61	81.66	81.68
81.68	81.82	81.96	82.21	82.33	82.39	82.46	82.48	82.57	82.96
83.06	83.11	83.14	83.3						

The total of the measurements is 3579.62.

(a) Determine the percentile rank of the measurement 80.4. In other words, determine what percent of data are less than or equal to 80.4.

(b) Determine the measurement corresponding to a percentile rank of 0.386. In other words, determine x such that 38.6% of the data are less than or equal to x.

(c) Determine the mean of the measurements.

(d) Determine the median of the measurements.

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

Random Variable F

Random Variable G

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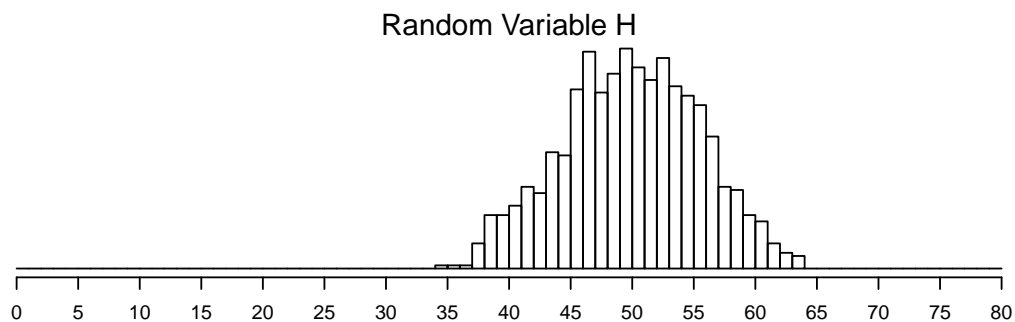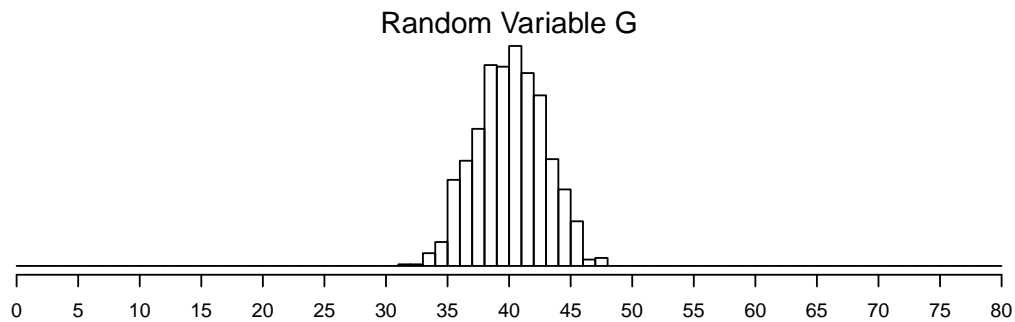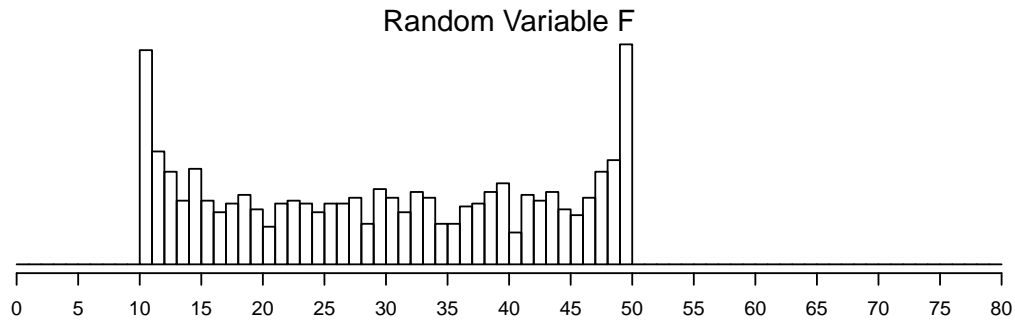
(a) Which distribution has the highest mean? (F, G, or H)

(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)

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

$$\begin{array}{|ccccc|} \hline 87 & 84 & 97 & 88 & 93 \\ \hline \end{array}$$

Please calculate the Average Absolute Deviation (also called the Average Distance from Mean: ADM) using the following formula:
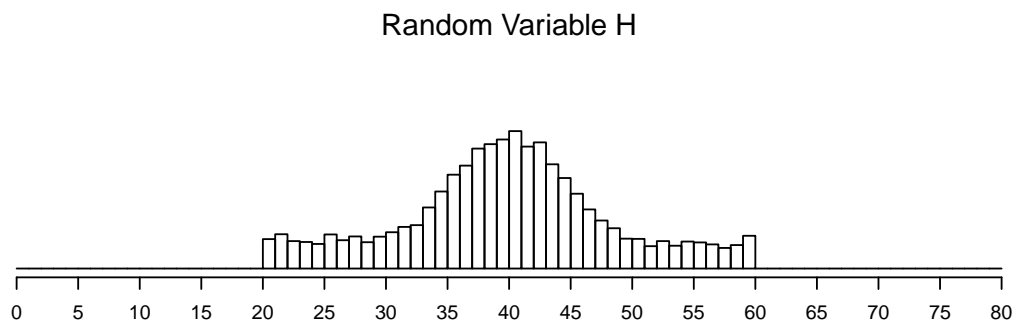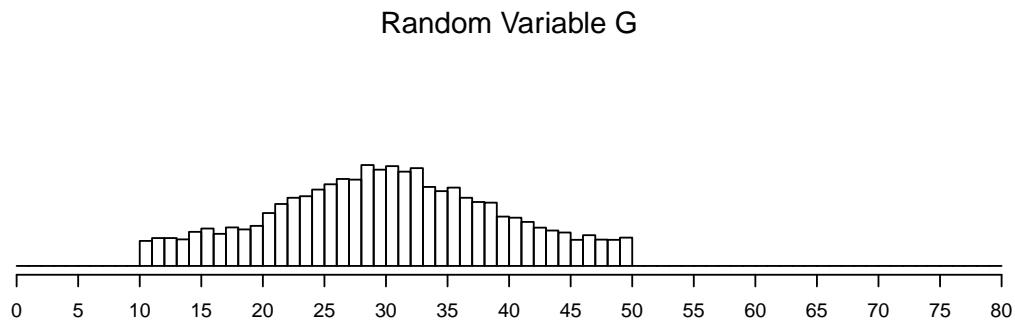
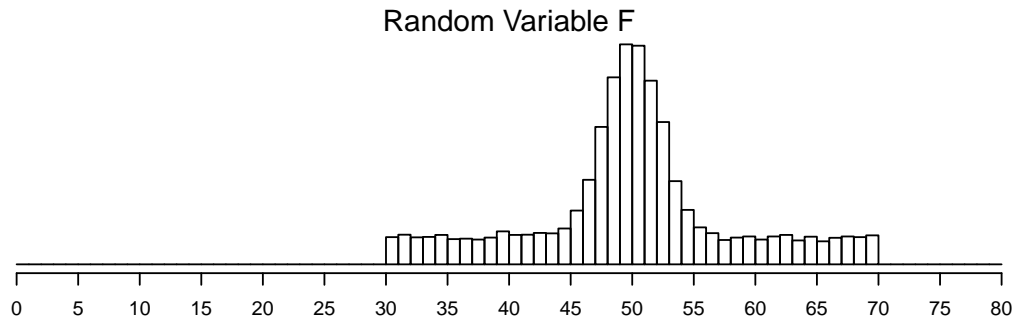$$\text{AAD} = \frac{\sum |x - \bar{x}|}{n}$$

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

34	33	32	33	35	36
32	34	33	36	36	33
32	34	35	33	33	34
32	32	35	34	32	34
33	35	35	32	35	32

8. **Problem**

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

Random Variable F

Random Variable G

Random Variable H

   (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)
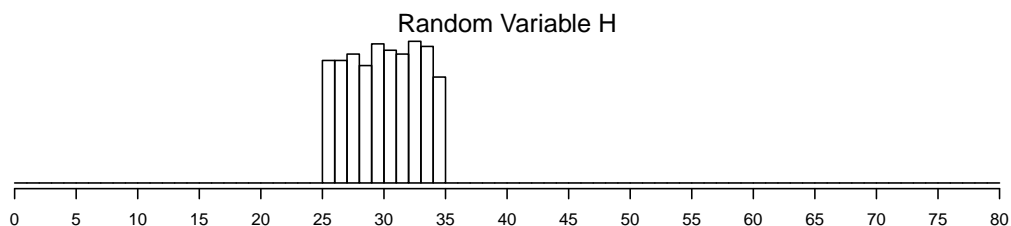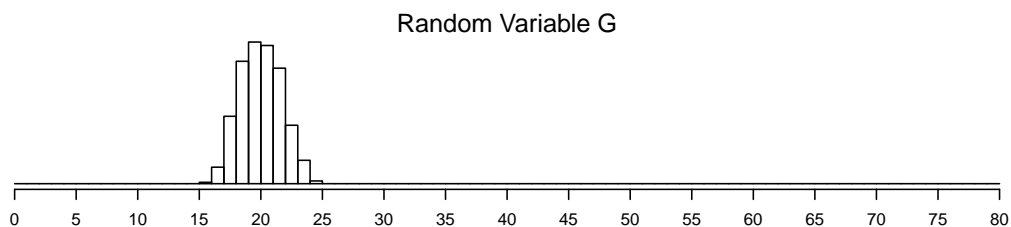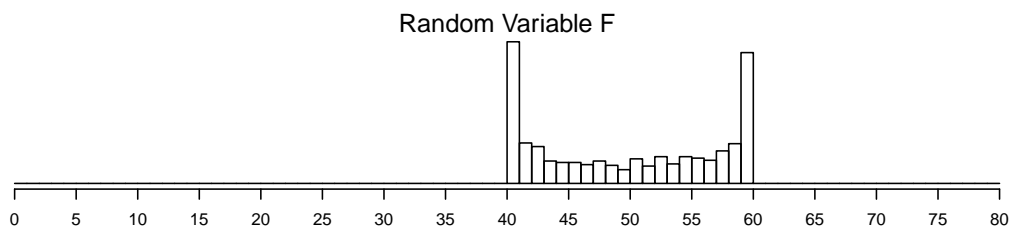
9. **Problem**

   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.

   Random Variable F

   Random Variable G

   Random Variable H

   (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.

10. **Problem**
    A continuous random variable was measured 400 times. The resulting histogram is shown below.
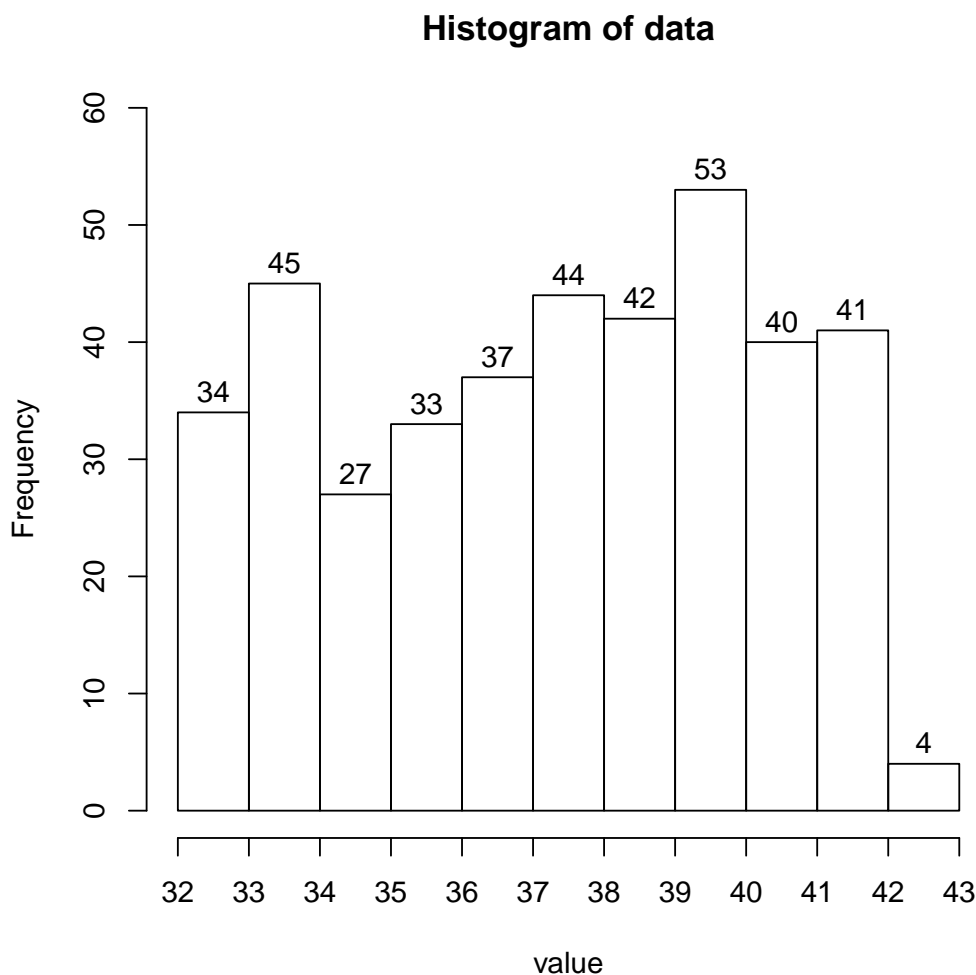
Histogram of data

(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 36?

(d) What percent of the measurements are less than 41?

(e) What percent of the measurements are between 36 and 41?

(f) What percent of the measurements are within 1 from 39? In other words, what percent of measurements satisfy $|x - 39| \leq 1$?

(g) Of the measurements greater than 36, what percent are less than 41?

(h) Estimate the value of the 19.75th percentile. In other words, determine a value such that 19.75% of the measurements are less than or equal to it.