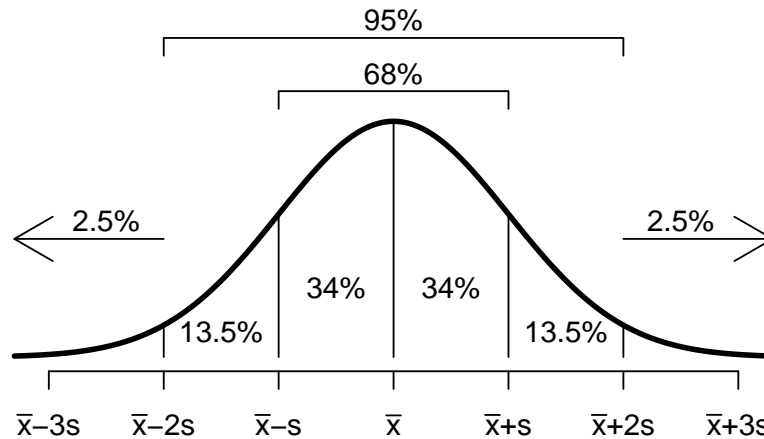


**1. Problem:**

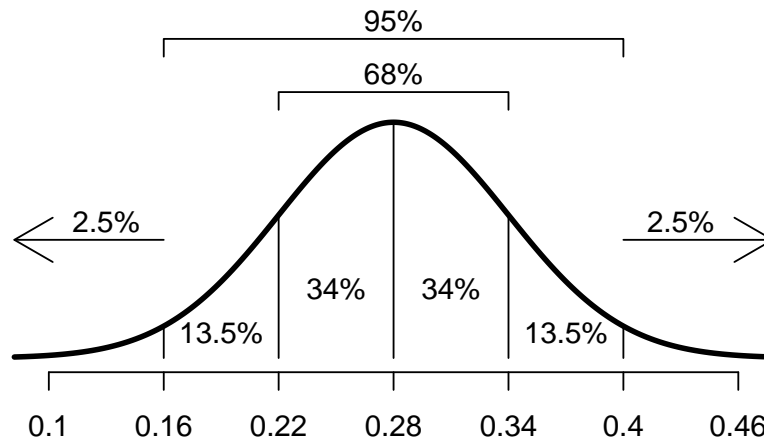
The figure below summarizes the *standard deviation rule* for normal distributions. In the figure,  $\bar{x}$  is the mean and  $s$  is the standard deviation. The percentages show the fraction of measurements that fall within various intervals.



A specific distribution is approximately normal with mean  $\bar{x} = 0.28$  and standard deviation  $s = 0.06$ .

- (a) What percent of the measurements are greater than 0.34?
- (b) What percent of the measurements are less than 0.28?
- (c) What measurement is greater than 97.5% of the measurements?
- (d) What measurement is less than 84% of the measurements?
- (e) What percent of the measurements are between 0.22 and 0.34?

**Solution:** It is probably best to start by redrawing (relabeling) the normal distribution with the specific values.



- (a) Because we are asked for the percent of measurements *greater* than 0.34, we add the areas to the right of 0.34.

16%

- (b) Because we are asked for the percent of measurements *less* than 0.28, we add the areas to the left of 0.28.

50%

- (c) We determine which leftward area has a total of 97.5%. This occurs at 0.4.

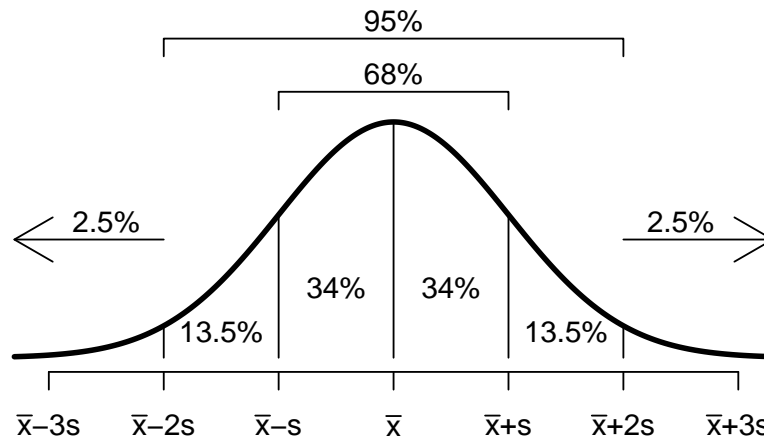
- (d) We determine which rightward area has a total of 84%. This occurs at 0.22.

- (e) We add the areas from 0.22 to 0.34.

68%

**2. Problem:**

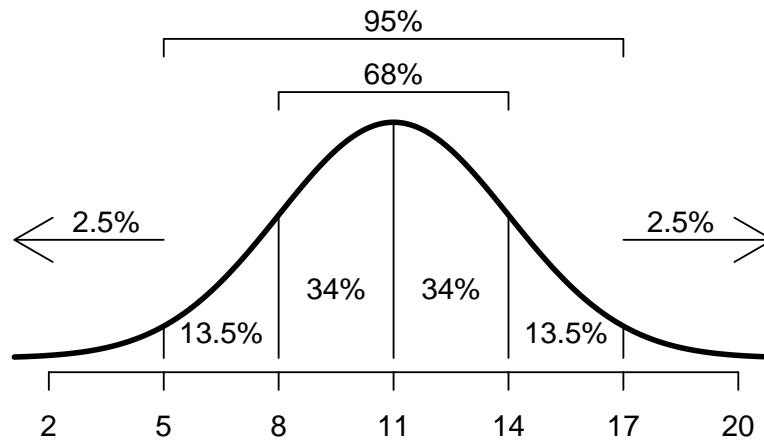
The figure below summarizes the *standard deviation rule* for normal distributions. In the figure,  $\bar{x}$  is the mean and  $s$  is the standard deviation. The percentages show the fraction of measurements that fall within various intervals.



A specific distribution is approximately normal with mean  $\bar{x} = 11$  and standard deviation  $s = 3$ .

- (a) What percent of the measurements are greater than 11?
- (b) What percent of the measurements are less than 8?
- (c) What measurement is greater than 97.5% of the measurements?
- (d) What measurement is less than 97.5% of the measurements?
- (e) What percent of the measurements are between 5 and 17?

**Solution:** It is probably best to start by redrawing (relabeling) the normal distribution with the specific values.



- (a) Because we are asked for the percent of measurements *greater* than 11, we add the areas to the right of 11.

50%

- (b) Because we are asked for the percent of measurements *less* than 8, we add the areas to the left of 8.

16%

- (c) We determine which leftward area has a total of 97.5%. This occurs at 17.

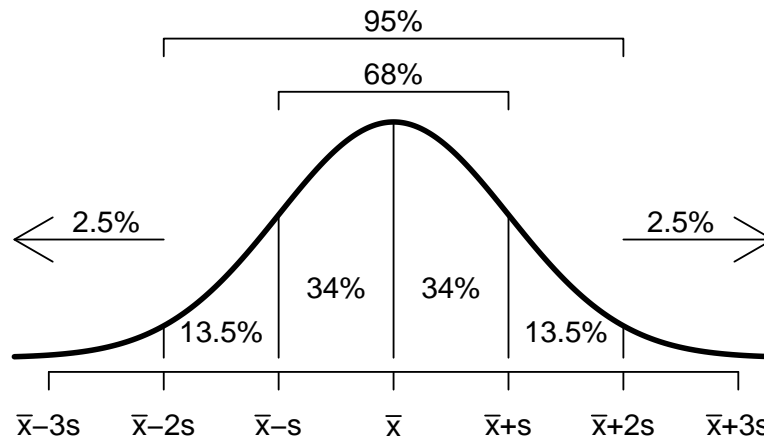
- (d) We determine which rightward area has a total of 97.5%. This occurs at 5.

- (e) We add the areas from 5 to 17.

95%

**3. Problem:**

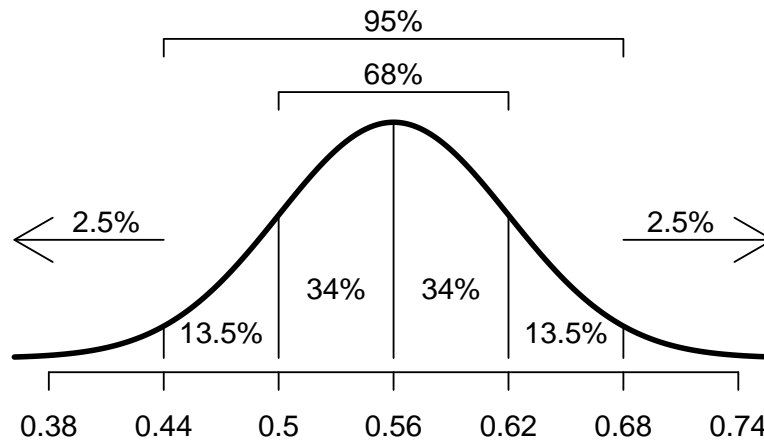
The figure below summarizes the *standard deviation rule* for normal distributions. In the figure,  $\bar{x}$  is the mean and  $s$  is the standard deviation. The percentages show the fraction of measurements that fall within various intervals.



A specific distribution is approximately normal with mean  $\bar{x} = 0.56$  and standard deviation  $s = 0.06$ .

- (a) What percent of the measurements are greater than 0.5?
- (b) What percent of the measurements are less than 0.68?
- (c) What measurement is greater than 2.5% of the measurements?
- (d) What measurement is less than 50% of the measurements?
- (e) What percent of the measurements are between 0.5 and 0.62?

**Solution:** It is probably best to start by redrawing (relabeling) the normal distribution with the specific values.



- (a) Because we are asked for the percent of measurements *greater* than 0.5, we add the areas to the right of 0.5.

84%

- (b) Because we are asked for the percent of measurements *less* than 0.68, we add the areas to the left of 0.68.

97.5%

- (c) We determine which leftward area has a total of 2.5%. This occurs at 0.44.

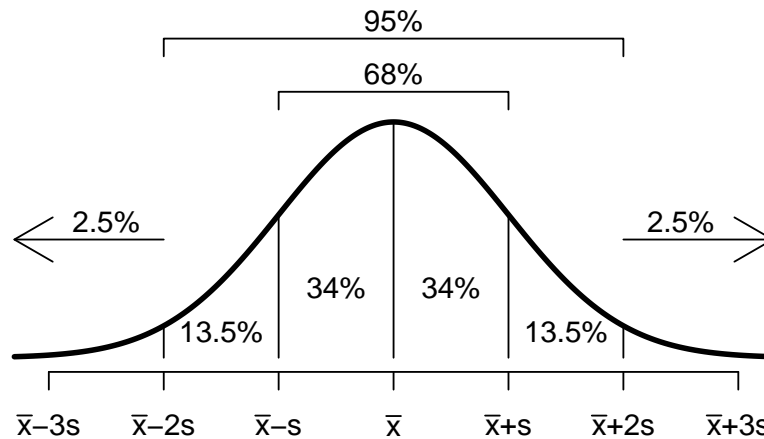
- (d) We determine which rightward area has a total of 50%. This occurs at 0.56.

- (e) We add the areas from 0.5 to 0.62.

68%

**4. Problem:**

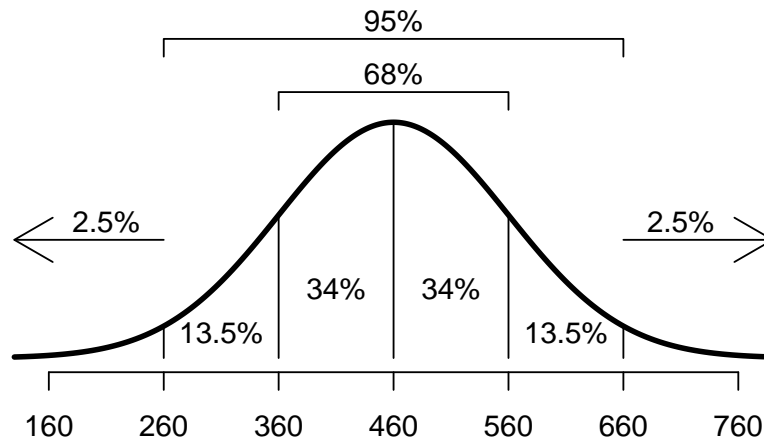
The figure below summarizes the *standard deviation rule* for normal distributions. In the figure,  $\bar{x}$  is the mean and  $s$  is the standard deviation. The percentages show the fraction of measurements that fall within various intervals.



A specific distribution is approximately normal with mean  $\bar{x} = 460$  and standard deviation  $s = 100$ .

- (a) What percent of the measurements are greater than 260?
- (b) What percent of the measurements are less than 360?
- (c) What measurement is greater than 97.5% of the measurements?
- (d) What measurement is less than 50% of the measurements?
- (e) What percent of the measurements are between 260 and 660?

**Solution:** It is probably best to start by redrawing (relabeling) the normal distribution with the specific values.



- (a) Because we are asked for the percent of measurements *greater* than 260, we add the areas to the right of 260.

97.5%

- (b) Because we are asked for the percent of measurements *less* than 360, we add the areas to the left of 360.

16%

- (c) We determine which leftward area has a total of 97.5%. This occurs at 660.

- (d) We determine which rightward area has a total of 50%. This occurs at 460.

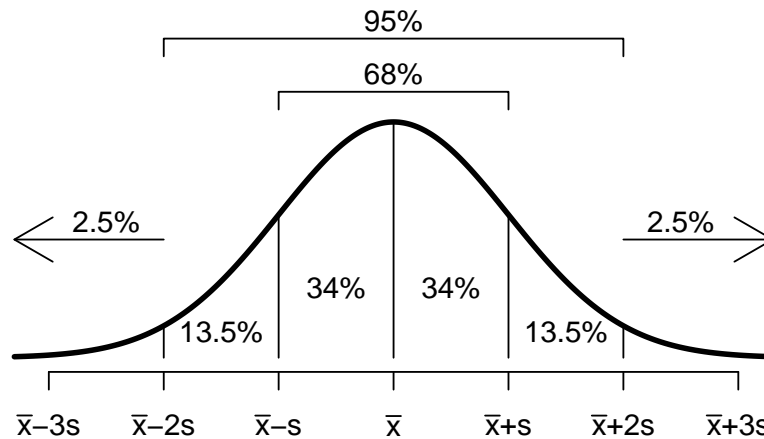
- (e) We add the areas from 260 to 660.

95%



**5. Problem:**

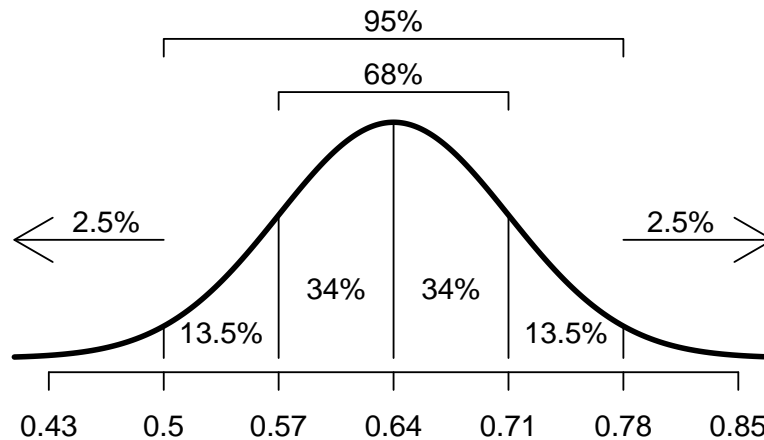
The figure below summarizes the *standard deviation rule* for normal distributions. In the figure,  $\bar{x}$  is the mean and  $s$  is the standard deviation. The percentages show the fraction of measurements that fall within various intervals.



A specific distribution is approximately normal with mean  $\bar{x} = 0.64$  and standard deviation  $s = 0.07$ .

- (a) What percent of the measurements are greater than 0.78?
- (b) What percent of the measurements are less than 0.71?
- (c) What measurement is greater than 16% of the measurements?
- (d) What measurement is less than 50% of the measurements?
- (e) What percent of the measurements are between 0.57 and 0.71?

**Solution:** It is probably best to start by redrawing (relabeling) the normal distribution with the specific values.



- (a) Because we are asked for the percent of measurements *greater* than 0.78, we add the areas to the right of 0.78.

2.5%

- (b) Because we are asked for the percent of measurements *less* than 0.71, we add the areas to the left of 0.71.

84%

- (c) We determine which leftward area has a total of 16%. This occurs at 0.57.

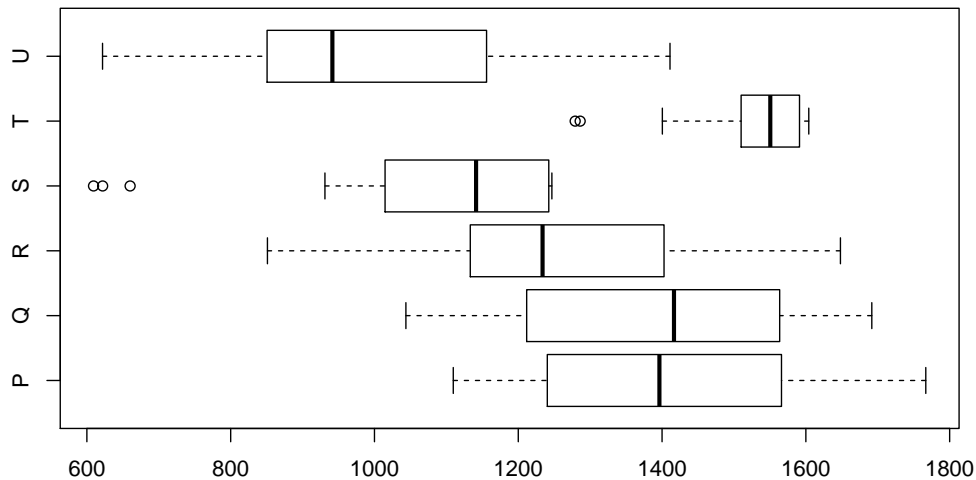
- (d) We determine which rightward area has a total of 50%. This occurs at 0.64.

- (e) We add the areas from 0.57 to 0.71.

68%

**6. Problem:**

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



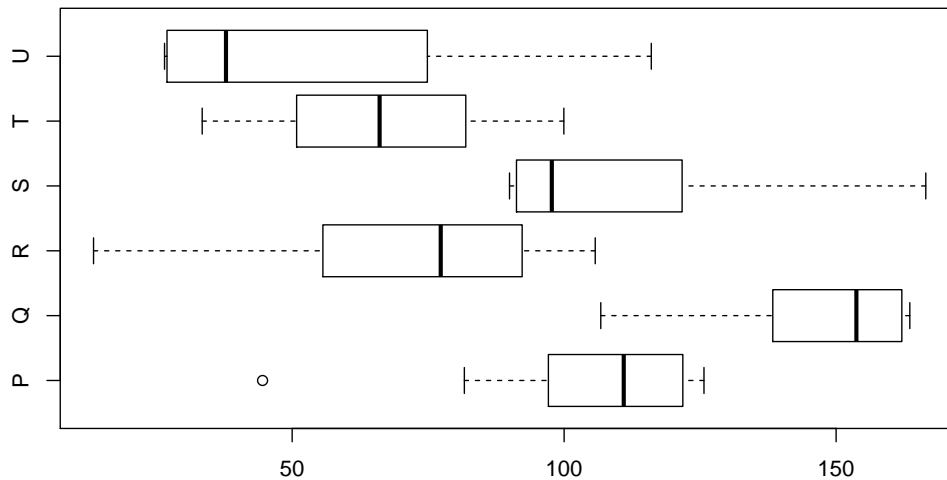
- Which variable produced the largest measurement?
- Which variable produced the smallest measurement?
- Which distribution has the largest median?
- Which distribution has the smallest median?
- Which distribution has the largest 25th percentile?
- Which distribution has the smallest 25th percentile?
- Which distribution has the largest 75th percentile?
- Which distribution has the smallest 75th percentile?
- Which distribution has the largest IQR?
- Which distribution has the smallest IQR?

**Solution:**

- (a) P
- (b) S
- (c) T
- (d) U
- (e) T
- (f) U
- (g) Q
- (h) T

**7. Problem:**

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



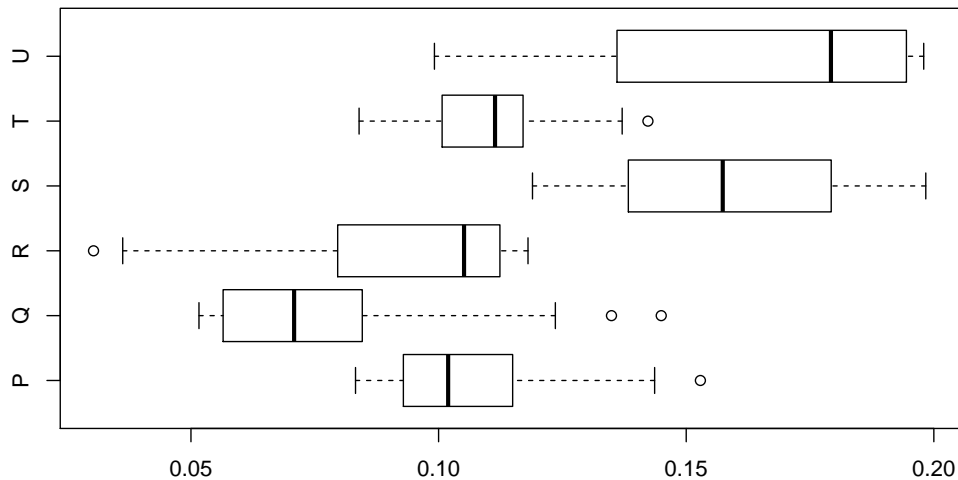
- (a) Which variable produced the largest measurement?
- (b) Which variable produced the smallest measurement?
- (c) Which distribution has the largest median?
- (d) Which distribution has the smallest median?
- (e) Which distribution has the largest 25th percentile?
- (f) Which distribution has the 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?

**Solution:**

- (a) S
- (b) R
- (c) Q
- (d) U
- (e) Q
- (f) U
- (g) U
- (h) Q

**8. Problem:**

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



- (a) Which variable produced the largest measurement?
- (b) Which variable produced the smallest measurement?
- (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?

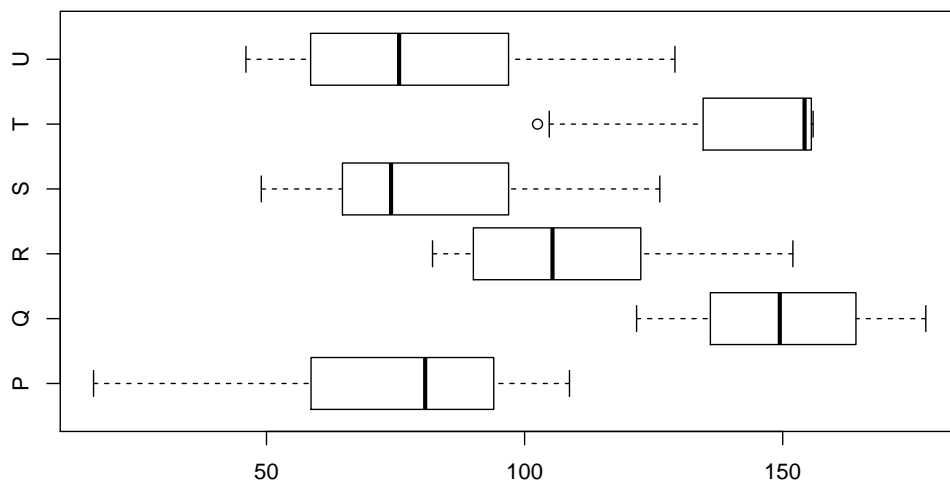
**Solution:**

- (a) S
- (b) R
- (c) U
- (d) Q
- (e) S
- (f) Q
- (g) U
- (h) T



**9. Problem:**

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



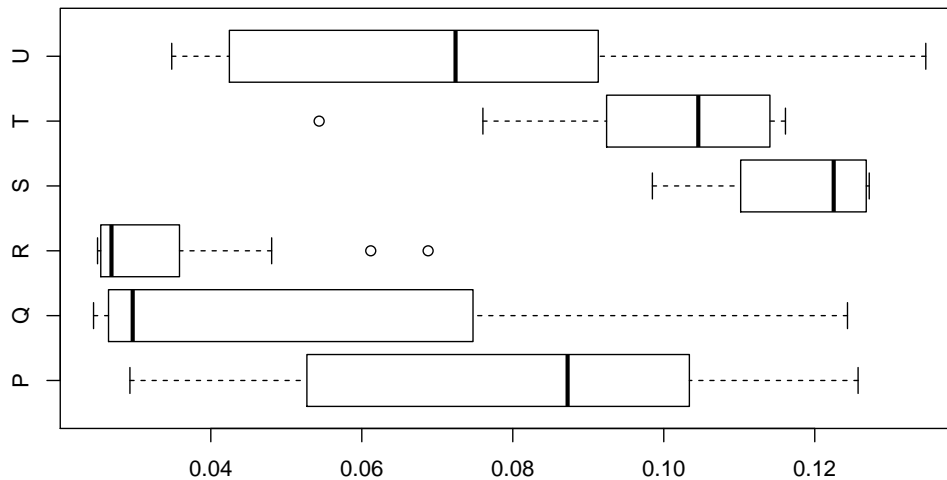
- (a) Which variable produced the largest measurement?
- (b) Which variable produced the smallest measurement?
- (c) Which distribution has the largest median?
- (d) Which distribution has the smallest median?
- (e) Which distribution has the largest 25th percentile?
- (f) Which distribution has the 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?

**Solution:**

- (a) Q
- (b) P
- (c) T
- (d) S
- (e) Q
- (f) U
- (g) U
- (h) T

**10. Problem:**

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



- (a) Which variable produced the largest measurement?
- (b) Which variable produced the smallest measurement?
- (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?

**Solution:**

- (a) U
- (b) Q
- (c) S
- (d) R
- (e) S
- (f) R
- (g) P
- (h) R