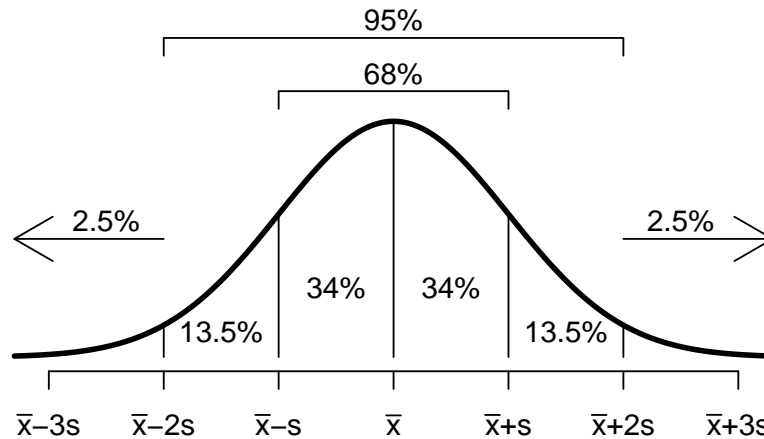


1. Problem:

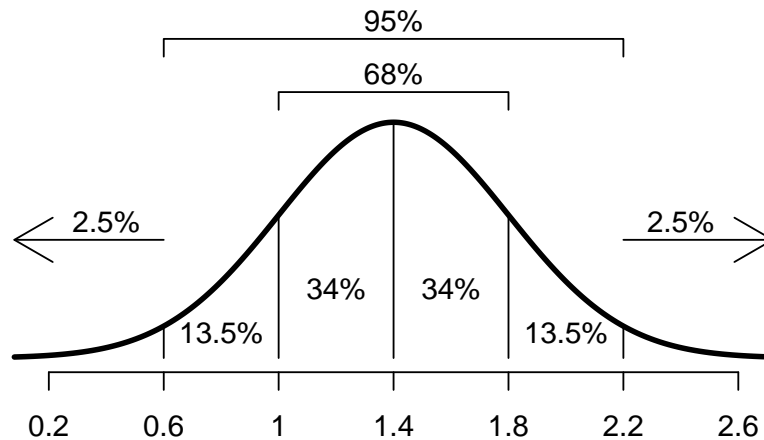
The figure below summarizes the *standard deviation rule* for normal distributions. In the figure, \bar{x} is the mean and s is the standard deviation. The percentages show the fraction of measurements that fall within various intervals.



A specific distribution is approximately normal with mean $\bar{x} = 1.4$ and standard deviation $s = 0.4$.

- (a) What percent of the measurements are greater than 1.4?
- (b) What percent of the measurements are less than 1.8?
- (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 0.6 and 2.2?

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 1.4, we add the areas to the right of 1.4.

50%

- (b) Because we are asked for the percent of measurements *less* than 1.8, we add the areas to the left of 1.8.

84%

- (c) We determine which leftward area has a total of 97.5%. This occurs at 2.2.

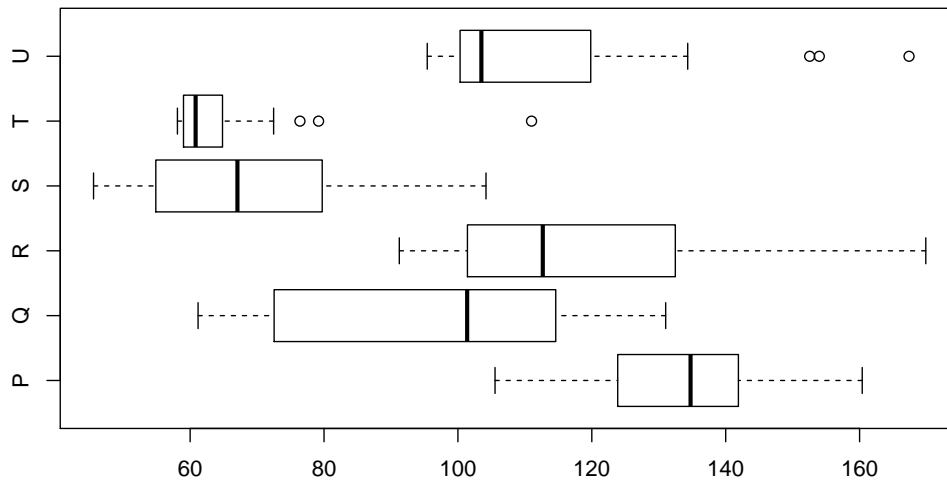
- (d) We determine which rightward area has a total of 97.5%. This occurs at 0.6.

- (e) We add the areas from 0.6 to 2.2.

95%

2. Problem:

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



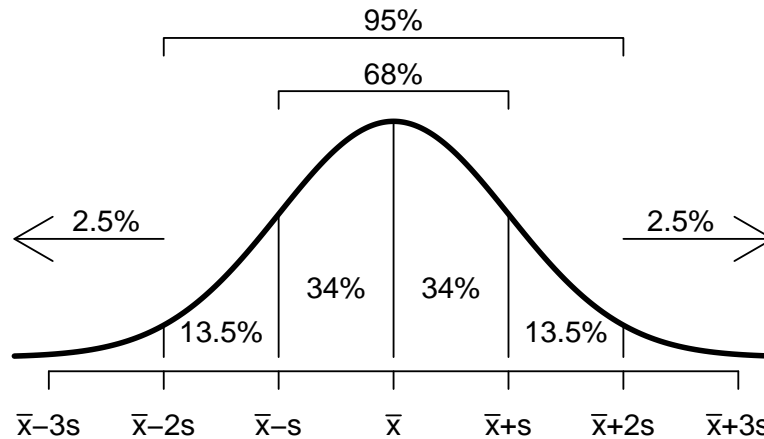
- (a) Which variable produced the largest measurement?
- (b) Which variable produced the smallest measurement?
- (c) Which distribution has the largest median?
- (d) Which distribution has the smallest median?
- (e) Which distribution has the largest 25th percentile?
- (f) Which distribution has the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

Solution:

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

1. Problem:

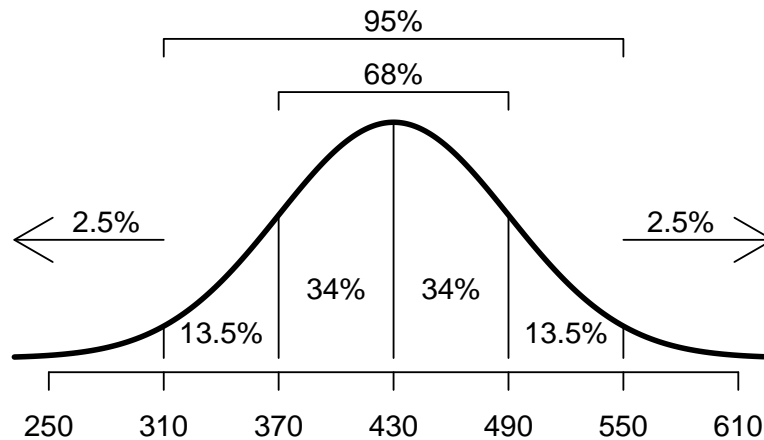
The figure below summarizes the *standard deviation rule* for normal distributions. In the figure, \bar{x} is the mean and s is the standard deviation. The percentages show the fraction of measurements that fall within various intervals.



A specific distribution is approximately normal with mean $\bar{x} = 430$ and standard deviation $s = 60$.

- (a) What percent of the measurements are greater than 550?
- (b) What percent of the measurements are less than 490?
- (c) What measurement is greater than 2.5% of the measurements?
- (d) What measurement is less than 84% of the measurements?
- (e) What percent of the measurements are between 310 and 550?

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 550, we add the areas to the right of 550.

2.5%

- (b) Because we are asked for the percent of measurements *less* than 490, we add the areas to the left of 490.

84%

- (c) We determine which leftward area has a total of 2.5%. This occurs at 310.

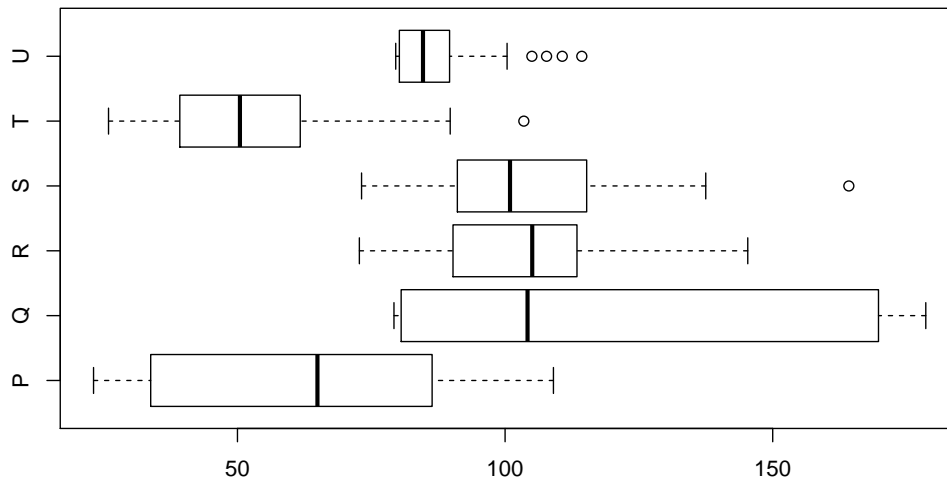
- (d) We determine which rightward area has a total of 84%. This occurs at 370.

- (e) We add the areas from 310 to 550.

95%

2. Problem:

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



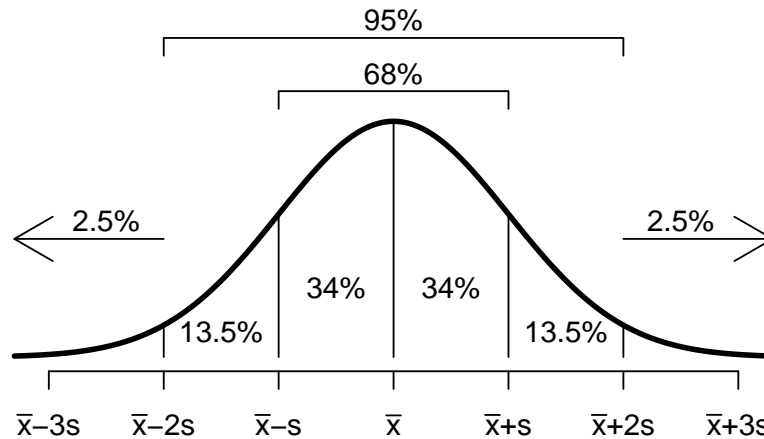
- (a) Which variable produced the largest measurement?
- (b) Which variable produced the smallest measurement?
- (c) Which distribution has the largest median?
- (d) Which distribution has the smallest median?
- (e) Which distribution has the largest 25th percentile?
- (f) Which distribution has the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

Solution:

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

1. Problem:

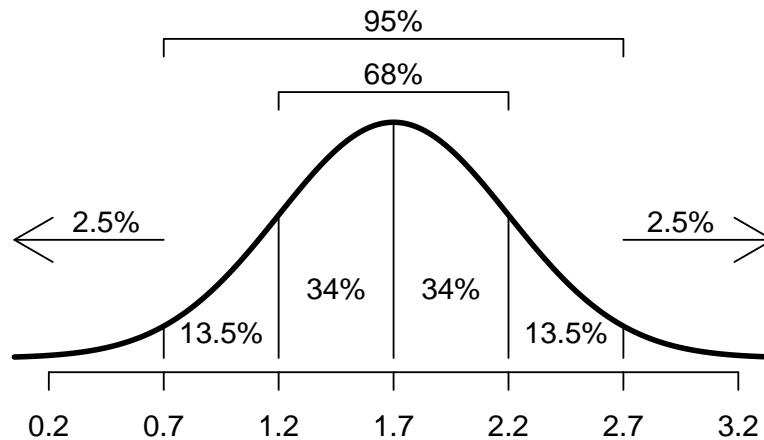
The figure below summarizes the *standard deviation rule* for normal distributions. In the figure, \bar{x} is the mean and s is the standard deviation. The percentages show the fraction of measurements that fall within various intervals.



A specific distribution is approximately normal with mean $\bar{x} = 1.7$ and standard deviation $s = 0.5$.

- (a) What percent of the measurements are greater than 2.2?
- (b) What percent of the measurements are less than 0.7?
- (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 1.2 and 2.2?

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 2.2, we add the areas to the right of 2.2.

16%

- (b) Because we are asked for the percent of measurements *less* than 0.7, we add the areas to the left of 0.7.

2.5%

- (c) We determine which leftward area has a total of 97.5%. This occurs at 2.7.

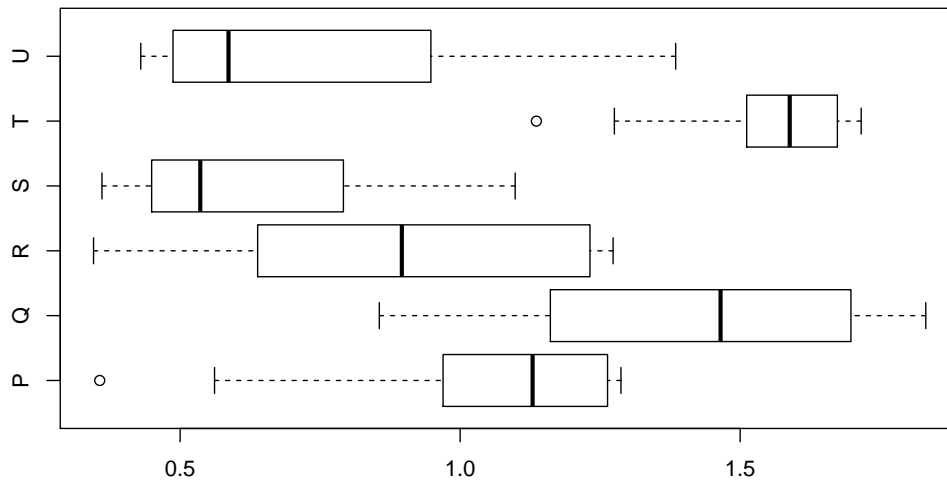
- (d) We determine which rightward area has a total of 84%. This occurs at 1.2.

- (e) We add the areas from 1.2 to 2.2.

68%

2. Problem:

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



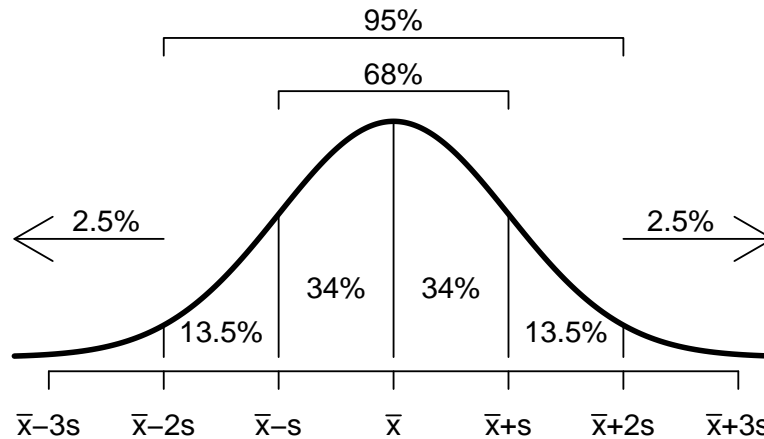
- (a) Which variable produced the largest measurement?
- (b) Which variable produced the smallest measurement?
- (c) Which distribution has the largest median?
- (d) Which distribution has the smallest median?
- (e) Which distribution has the largest 25th percentile?
- (f) Which distribution has the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

Solution:

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

1. Problem:

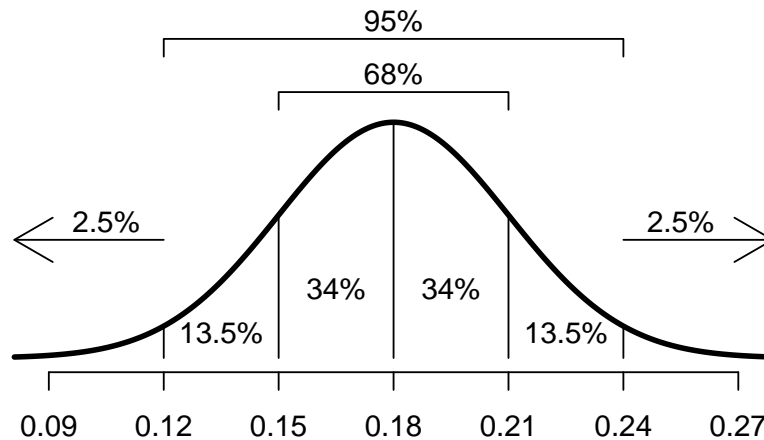
The figure below summarizes the *standard deviation rule* for normal distributions. In the figure, \bar{x} is the mean and s is the standard deviation. The percentages show the fraction of measurements that fall within various intervals.



A specific distribution is approximately normal with mean $\bar{x} = 0.18$ and standard deviation $s = 0.03$.

- (a) What percent of the measurements are greater than 0.24?
- (b) What percent of the measurements are less than 0.15?
- (c) What measurement is greater than 2.5% of the measurements?
- (d) What measurement is less than 16% of the measurements?
- (e) What percent of the measurements are between 0.15 and 0.21?

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 0.24, we add the areas to the right of 0.24.

2.5%

- (b) Because we are asked for the percent of measurements *less* than 0.15, we add the areas to the left of 0.15.

16%

- (c) We determine which leftward area has a total of 2.5%. This occurs at 0.12.

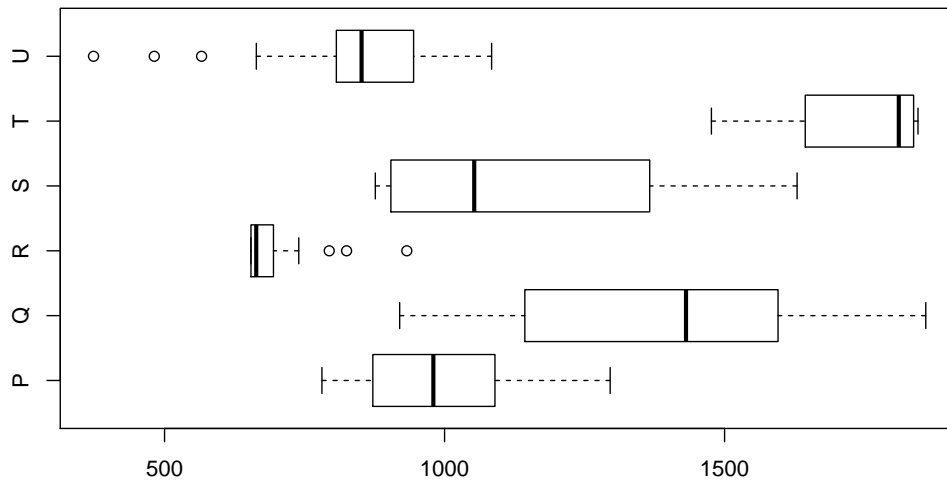
- (d) We determine which rightward area has a total of 16%. This occurs at 0.21.

- (e) We add the areas from 0.15 to 0.21.

68%

2. Problem:

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



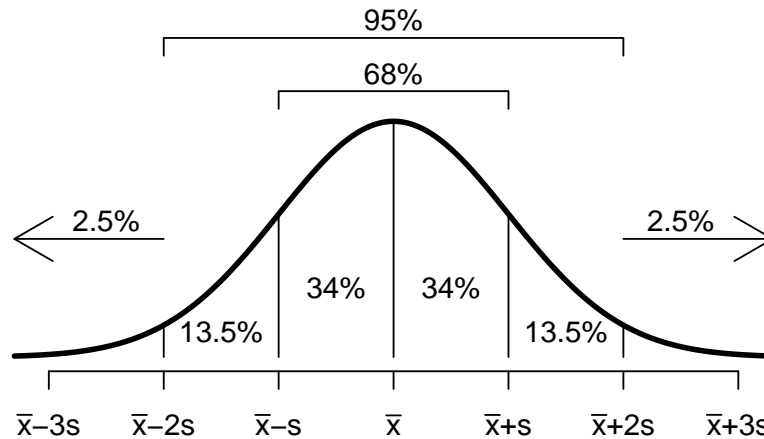
- (a) Which variable produced the largest measurement?
- (b) Which variable produced the smallest measurement?
- (c) Which distribution has the largest median?
- (d) Which distribution has the smallest median?
- (e) Which distribution has the largest 25th percentile?
- (f) Which distribution has the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

Solution:

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

1. Problem:

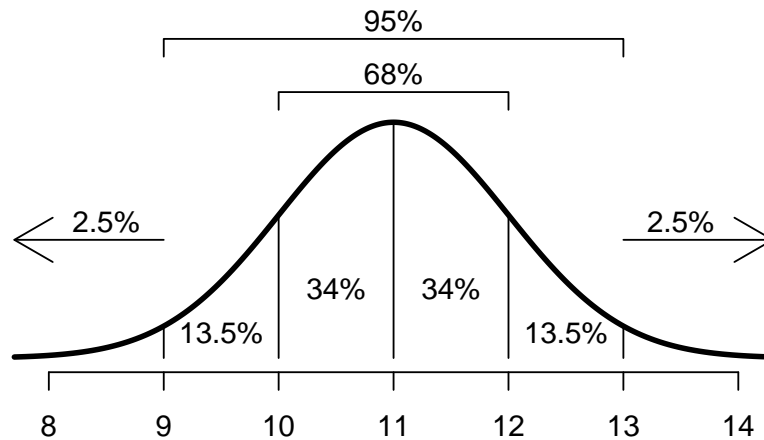
The figure below summarizes the *standard deviation rule* for normal distributions. In the figure, \bar{x} is the mean and s is the standard deviation. The percentages show the fraction of measurements that fall within various intervals.



A specific distribution is approximately normal with mean $\bar{x} = 11$ and standard deviation $s = 1$.

- (a) What percent of the measurements are greater than 10?
- (b) What percent of the measurements are less than 9?
- (c) What measurement is greater than 84% of the measurements?
- (d) What measurement is less than 50% of the measurements?
- (e) What percent of the measurements are between 10 and 12?

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 10, we add the areas to the right of 10.

84%

- (b) Because we are asked for the percent of measurements *less* than 9, we add the areas to the left of 9.

2.5%

- (c) We determine which leftward area has a total of 84%. This occurs at 12.

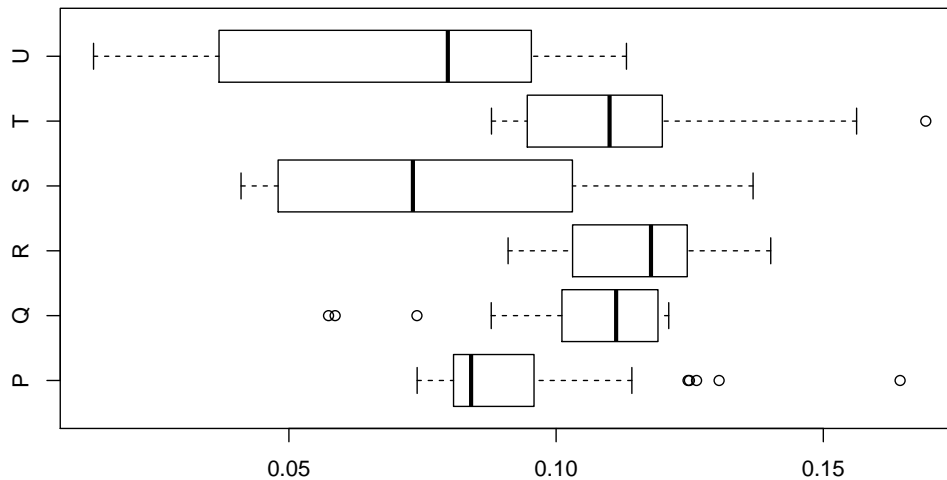
- (d) We determine which rightward area has a total of 50%. This occurs at 11.

- (e) We add the areas from 10 to 12.

68%

2. 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?

Solution:

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