Fencing is a semi-contact sport that is based on sword fighting. There are three weapon types in fencing, epee, foil, and sabre. Fencing consists of bouts in which two fencers face-off against each other. During bouts fencers attempt to hit each other with their weapon within the valid target area. A bout is won by the first fencer to reach 15 touches, if the bout ends before either fencer has 15 touches, the fencer with the most touches is declared winner.

At the collegiate level the fencing season comes to a close with the NCAA Fencing Championships. The championship consists of a 24-fencer round-robin in which each fencer in the discipline faces each other in 5-touch bouts. Fencers are ranked based on descending indicator scores which is the difference in touches sent and touches received. The top 4 fencers from each discipline face each other off in a round of 15-touch semifinal and championship bouts. The fencer to win the championship places number 1 in the discipline.

This fencing dataset (<fencing.csv>) contains the final results for each individual fencer in the 2024 NCAA Fencing Championships. It has data for both men and women in all three weapon types. The indicator variable in particular is a good measure of offensive strength. Investigating this variable in conjuncture with the number of victories per fencer in the tournament can assess the performance of fencers in the dataset.

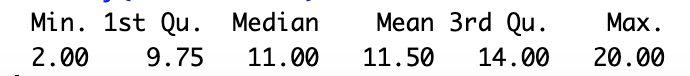
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| --- | --- |
| **Variable** | **Description** |
| *Place* | The place the fencer finished the tournament in. |
| *Tied* | If the fencer was tied for their place with someone else, *TRUE* or *FALSE*. |
| *Name* | The fencer's name in *first name last name* order. |
| *School* | The school the fencer is representing. |
| *Victories* | The total victories the fencer had in the tournament. |
| *Bouts* | The number of bouts the fencer was in in the tournament. |
| *Pct* |  |
| *TS* | The total touches sent by the fencer in the tournament, meaning touches they scored against opponents. |
| *TR* | The total touches received by the fencer in the tournament, meaning touches scored against the fencer. |
| *Ind* |  |
| *Gender* | The fencer's gender, *Women* or *Men*. |
| *Ivy* | If the fencer's school is in the Ivy League, *Ivy* or *Non-Ivy*. |

1. Which of these histograms of *Victories* for each *Weapon* and *Gender* combination looks normally distributed?

A graph of different levels of a graph

Description automatically generated with medium confidence

1. The mean number of *Victories* for women’s' foil is 11.5 and the standard deviation is 3.97. Can it be concluded that the distribution of *Victories* for women’s' foil is normal?
2. The 5 number summary of *Victories* for women’s' foil is provided below. Calculate the IQR of *Victories* for women’s foil.



1. This table shows the 5 fencers with the least *Victories* in women's foil. Identify any outliers using the IQR method.

A table with numbers and symbols

Description automatically generated

1. Draw a boxplot of *Victories* for women’s' foil.
2. Describe the trend of this scatterplot of *Victories* and *Ind*.

A graph with blue dots

Description automatically generated

1. The least squares line of *Victories* predicted by *Ind* is . Interpret the slope of the line.
2. A fencer has an indicator score of 16, calculate their predicted *Victories*.
3. The actual value of *Victories* for a fencer with an indicator score of 16 is 15, calculate the residual.
4. The model has an R2 value of 92%. Explain the significance of this value.