

Your Task

You will be investigating and comparing data distributions of ATP Men's Tennis player earnings for 2019.

The investigation has been broken up into three parts:

- Investigate and compare 2019 earnings distributions of players ranked between 16-30 to that of players ranked and 31-45 and 46-60.
- Investigate the earnings distribution of the top 15 ranked players.
- Compare the top 15 ranked player's earnings with lower ranked players.

You will need a graphics calculator and a separate piece of paper to complete the questions.

The data table gives the earnings (in dollars) for ATP Men's Tennis players ranked between 16 and 60 in 2019. Use the data to answer the following questions.

Rank 16 – 30		Rank 31 – 45		Rank 46 – 60	
Name	\$	Name	\$	Name	\$
Nick Kyrgios	556370	Marin Cilic	398270	Pierre-Hugues Herbert	283910
Daniel Evans	553715	Benoit Paire	394326	Kyle Edmund	268247
Fabio Fognini	538868	Hubert Hurkacz	390419	Albert Ramos-Vinolas	261713
Pablo Carreno Busta	535522	Jan-Lennard Struff	384297	Feliciano Lopez	255548
Diego Schwartzman	506541	Yoshihito Nishioka	355329	Ugo Humbert	252793
Stan Wawrinka	488347	Alex De Minaur	347126	Tommy Paul	252665
Grigor Dimitrov	484736	Kevin Anderson	343649	Nikola Pietrangeli	245128
Taylor Fritz	442220	Nikoloz Basilashvili	343031	Pablo Cuevas	233690
Milos Raonic	429852	Joe Salisbury	333339	Gilles Simon	228745
Viktor Troicki	426949	Guido Pella	329167	Cameron Norrie	226362
Casper Ruud	422823	Rajeev Ram	305264	Aljaz Bedene	224975
Borna Coric	421992	Filip Krajinovic	302354	Corentin Moutet	223922
Denis Shapovalov	415387	Marton Fucsovics	293105	Miomir Kecmanovic	220523
Tennys Sandgren	412750	John Millman	290705	Gianluca Mager	216729
John Isner	411414	Alexander Bublik	289226	Lloyd Harris	214732

Source: <http://stats.washingtonpost.com/tennis/rankings.asp?tour=ATP&rank=3>

Players ranked 16-60 2019 earnings

1. Use your calculator to:

a. Construct a histogram of yearly earnings for players ranked 31-45.

Use class intervals 315 000-329 999, 330 000-344 999 etc.

- Sketch the histogram. Remember to give it a title and label the axis.
- What is the shape of the histogram?
- How many players ranked from 31 to 45 earned between \$300,000 and \$330,000 in 2019?
- What percentage of players ranked between 31 and 45 earned less than \$300,000?

b. Determine the following summary statistics for the 2019 earnings of Men's ATP Tennis players ranked from 31 to 45:

- \bar{x} =
- S =
- Min =
- Q_1 =
- M =
- Q_3 =

c. Use the summary statistics to complete the following report.

The mean weekly salary for Men's ATP Tennis Players ranked from 31 to 45 in 2019 was \$..... Fifty percent of these players earned more than \$.... in 2019. The range of the 2019 earnings for players ranked 31 to 45 was \$.... while the interquartile range was \$.... and the standard deviation of earnings was \$..... Twenty-five percent of these players earned more than \$.... in 2019.

2. Use your calculator to construct boxplots of the 2019 earnings for players ranked 1-30, 31-45 and 46-60 on the same axis.

a. Sketch the boxplots.

b. Use the information from the boxplots to complete the following report which compares the 2019 earnings distributions of ATP ranked Men's Tennis players in terms of centre (medians) and spread (IQR's)

The median 2019 earnings for players ranked between 16 and 30 ($M = \dots$) is \$.... more than players ranked between 31 and 45 ($M = \dots$), and \$.... more than players ranked between 46 and 60 ($M = \dots$). The spread in the 2019 earnings is highest for players ranked between ($IQR = \dots$) and lowest for players ranked between ($IQR = \dots$). There are no outliers in the data sets.

What about the top 15 ranked players?

The table below gives the earnings (in dollars) for top 15 ranked ATP Men's Tennis players in 2019. Use the data to answer the questions.

3. Without using your calculator, identify Q_1 , M and Q_3 in the column of 2019 earnings for the top 15 ranked players. Write a five point summary of the data.
4. The shape of the data:
 - a. What shape is the distribution?
 - b. Sketch the shape you would expect a boxplot and a histogram of the data to be.
5. Use your five point summary to write a report comparing the centre, shape and spread of the top 15 ranked player's earnings to one of the previous distributions.
6. Why weren't you asked to include the top 15 ranked player earnings distribution in the parallel boxplots?

Rank 1 – 15	
Name	\$
Novak Djokovic	4486616
Dominic Thiem	1741574
Rafael Nadal	1354342
Gael Monfils	1145455
Alexander Zverev	983452
Roberto Bautista Agut	900316
Stefanos Tsitsipas	810608
Daniil Medvedev	722540
Roger Federer	714792
Andrey Rublev	684657
Felix Auger-Aliassime	664700
Cristian Garin	651909
Karen Khachanov	651254
Dusan Lajovic	631970
David Goffin	575527

Source: [Washington Post](#)

It seems like a lot of money, but is it?

The following in an extract from an [ABC News article](#).

In 2014, the International Tennis Federation commissioned a study that suggested the average player cost for a tennis professional ranked between 101 and 250 in the world (without support staff and taxes) for a single season was \$71,371. A more inclusive look suggested about \$250,000 is required to sustain an average-level player and support staff on tour for a year.

Time off the court is money out of their pockets. Injured tennis players often try to rush back from their ailments quickly to make sure they keep the cash coming. As the coronavirus pandemic continues to have a global impact ATP Player Council president Novak Djokovic, is lobbying for a proposed fighting fund to help the lower-ranked professionals on tour keep their heads above water. Djokovic and other top players, such as Rafael Nadal and Roger Federer, theorise that without an active lower level the elite base of men's tennis will suffer over time.

Source: <https://www.abc.net.au/news/2020-04-30/coronavirus-tennis-most-players-lose-money-playing-the-game/12198950>

7. Use the above information and the earning statistics you have calculated to make a statement for or against the need for a "fighting fund" for lower ranked professional tennis players.