

# PROJECT #2 TUTORIAL



## ARE YOU READY FOR SOME FOOTBALL?

Do you play in a fantasy football league? Do you refuse to move from your couch on Sunday afternoons? Maybe you've simply wondered what Monday Night Football is all about or perhaps you have a crush on Mark Sanchez. Since the National Football League (NFL) televised its first game in 1939, football has captured the heart of many Americans. From posters to bed sheets, the NFL and its players have permeated the American home.

Quarterbacks tend to be the face of their teams and receive a great deal of publicity, both personally and professionally. In particular, in the 1970s, Don Smith introduced the Passer Rating to have a standard method of comparing quarterback performance for players from various teams. It is a statistic used for rating a quarterback's passing performance during a game, one season, or even his career. (Note: It does not judge a quarterback's overall performance.)

Don Weiss, a former NFL Public Relations Director, conjectured that the Passer Rating "was so complicated, people didn't understand it, so they (the NFL) accepted it." Ben Roethlisberger, the current quarterback of the Pittsburgh Steeler's, declared, "I heard it's the most ridiculous amounts of numbers and gadgets. I have no idea what it means." He is not alone. Many active football players admit they are puzzled about how it works, but their insights are summarized by Steve Young (NFL Hall of Fame quarterback): "The truth is, if you're playing decent football, your rating is high."

So whether you actively trade players in your fantasy league, or you just want to know why you do not have permission to change the television channel on Monday night, this assignment will shed light on the "illusive" workings of the NFL Passer Rating and show Ben (and the "Pros") how it is done.

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There are four components to the Passer Rating:

1. I- the Interception Rating
2. C- the Completion Rating
3. Y- the Yardage Rating
4. T- the Touchdown Rating.

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*Based on the talk "NFL Passer Rating" by Professor Jim Messenger, Anne Arundel Community College, MD, Spring 2007  
Adapted by: Professor Clayton & Professor Riordan, Anne Arundel Community College, MD*

We will begin by examining the Interception Rating, **I**. Below is a table of Quarterback Steve McNair's 2006 NFL season with the Baltimore Ravens.

Steve McNair	interceptions	completions	yards	touchdowns	attempts
2006 season	12	295	3050	16	468

Source: <http://www.nfl.com/players/stevemcnair/profile?id=MCN033803>

**Step 1:** Determine the percentage of attempts that were interception.

$$A = PB \quad 12 = P * 468 \quad P = \frac{12}{468} = .02564 = 2.56\% \text{ (rounded to the nearest hundreth)}$$

It was determined by Don Smith that a value of  $i = 5.5$  percent should be considered average and corresponds to an Interception Rating of  $I = 1$ . Also, a value of  $i = 1.5$  percent should be considered exceptional and corresponds to an Interception Rating of  $I = 2$ .

Given this information, we could say that Steve McNair's interception percentage during his 2006 season was closer to exceptional than average. In other words, it was very good.

**Step 2:** Create two ordered pairs using the information supplied.

We can think of this information from Don Smith as ordered pairs  $(i, I)$ , which relate each interception percentage  $i$  to its Interception Rating  $I$ :

Point 1:  $(5.5, 1)$

Point 2:  $(1.5, 2)$

**Step 3:** Find the slope of the the line that passes through these two points.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2 - 1}{1.5 - 5.5} = \frac{1}{-4} = -0.25.$$

**Step 4:** Set up the **Point-Slope** equation of the line that gives the Interception Rating **I** in terms of  $i$ .

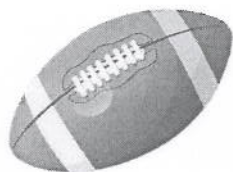
$$y - y_1 = m(x - x_1)$$

But our ordered pairs are  $(i, I)$  instead of  $(x, y)$  so we have

$$I - I_1 = m(i - i_1)$$

$$I - I_1 = -0.25(i - i_1)$$

$$I - 1 = -0.25(i - 5.5)$$





**Step 5:** Take your equation from Step 4 and convert it to **Slope-Intercept** form.

$$I - 1 = -0.25(i - 5.5)$$

$$I - 1 = -0.25i + 1.375$$

$$I = -0.25i + 1.375 + 1$$

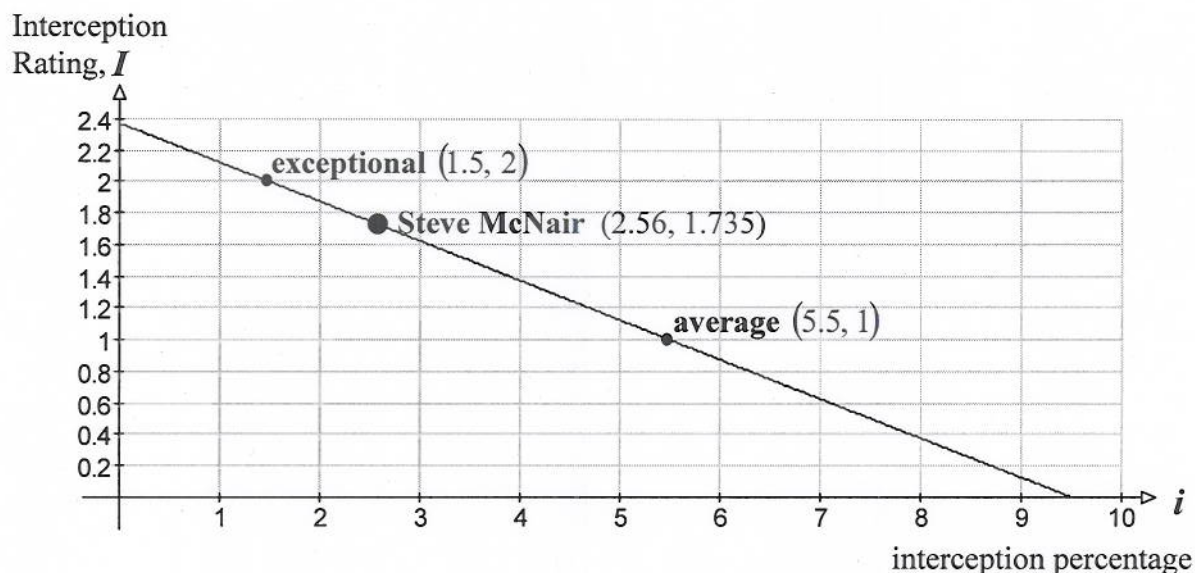
$$I = -0.25i + 2.375$$

**Step 6:** Determine Steve McNair's Interception Rating using Step 1 and the equation you just found above. *Don't round your answer.*

$$I = -0.25(2.56) + 2.375 = 1.735$$

$$I = 1.735$$

**Step 7:** Create a graph of the linear function **I** using the original ordered pairs for exceptional and average.



**Step 8:** Plot Steve McNair's ordered pair: (2.56, 1.735). *Note: If calculated correctly, this ordered pair should be on the line.*

Note: When  $i = 0$  percent, the best possible performance,  $I = 2.375$ . This is the maximum value a quarterback can have for his Interception Rating.

**FACT:** To remain consistent, the maximum value any of the four components **I**, **C**, **Y**, **T**, can take on is 2.375. Also, none of the four components is allowed to be less than zero.

We can follow the same steps to find the completion rating,  $C$ , and the yardage rating,  $Y$ , for Steve McNair's 2006 season with the Baltimore Ravens.

The table below has the values for  $I$ ,  $C$ , and  $Y$  for Steve's ratings.

Interception Rating, $I$	1.735
Completion Rating, $C$	1.65
Yardage Rating, $Y$	0.879

The only missing rating is the touchdown rating. You will determine this in class. Once you find this rating, you will be guided to find the overall Quarterback Passer Rating. Please be sure to bring this packet with you to class since you will need some of the information from it.

