Data Management **Ch 4 Probability** **NFL Project**

An Introduction to Simulations and Experimental Probability
Use RandInt to generate random numbers.

1. Find your team's winning percentage from last year's season. Use this percentage to simulate the likelihood of your team winning 8 or more games this year.

2. Find your quarterback's completion percentage from last year's season. Use this percentage to simulate the likelihood that your quarterback will complete over 500 out of 1000 attempts.

3. Using your QB's completion percentage fill in the following chart.

Number of Attempted Throws	Total Number of Completions	Observed Probability
100		
200		
300		
...		
1000		

4. Find the success rate as a percentage for your team's field goal kicker.
Design and conduct a simulation that will help determine the experimental probability that:
a) he misses any field goals out of 48 attempts.
b) he might miss 2 field goals in a row out of 48 attempts.

Theoretical Probability

5. Find the teams with the following :
i) a) more Touchdowns (TD's) than your team.
b) What is the theoretical probability of selecting a team with more TD's than your team?
c) more Total Rushing Yards (RY's), than your team.
d) What is the theoretical probability of selecting a team with more TD's than your team?
e) more TD $\cap$ RY than your team
f) Find P(TD $\cap$ RY)?
g) more TD $\cup$ RY than your team
h) Find P(TD $\cup$ RY)?
i) Find $P(TD)^C = ?$ $P(RY)^C = ?$
ii) Provide a Venn Diagram.

sec 4.3 Finding Probability Using Sets

6. Given :
A= {List of teams whose QB attempted more passes (Att) than your QB}
B = {List of teams whose QB who completed longer passes than 40 yards than your QB}

i) Describe in words the members that belong to the following sets

a) $A \cap B$ b) $A \cup B$

ii) Describe in words the members that belong to the following sets

a) A^C b) $(A \cup B)^C$

7. Given that A = Number of Teams with QB's whose Comp's are higher than your QB
B = Number of Teams with QB's whose TD's are higher than your QB
C = Number of Teams with QB's whose INT's are higher than your QB

i) Find the following a) $n(A \cap B)$ b) $n(B \cap C)$ c) $n(A \cap C)$ d) $n(A \cap B \cap C)$

ii) Using the above information and a Venn diagram, represent all the sets A, B and C
Include how many teams are in each region

iii) From the Venn diagram a) How many teams have a QB that **only** has more completions than your QB?
b) What percent of the teams have QB's who have neither
more COMP's, more INT's or more TD's than your QB.

8. From Question 7, show that $P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(A \cap C) - P(B \cap C) + P(A \cap B \cap C)$.

sec 4.5 Probability with Tree Diagrams and Outcome Tables

9. Construct a tree diagram that represents the chances of playing the teams in your division in alphabetical order.

10. A = {The teams of all QB's whose INT's are higher than your QB}
B = {The teams of all Running Backs whose Fumbles are higher than your RB}

Find a) Why can you consider the events A and B as independent events?
b) Find $P(A \cap B) = P(A) * P(B)$ Since the events are independent.

sec 4.6 Counting Techniques and Probability Strategies - Permutations

11. Given that any team in regular season plays the 3 teams in their division twice and 10 teams only once, how many ways could the games be played?

12. Calculate the number of ways your team could win or lose. (There are no ties)

13. For fun, calculate the number of ways you can rearrange your full team name
Ie. Denver Broncos = full team name.

sec 4.7 Counting Techniques and Probability Strategies - Combinations

14. Eight teams play in the wild card playoff round. What are the number of wild card playoff groups that can be made from teams that your team plays in the regular season if:
    a) any one can be in the wildcard group
    b) if your team must be in the wildcard group.
    Remember that you created a schedule back in question # 1

15. From your team's regular season roster the coach must select 5 players to be team leaders. The coach decides to select the leaders from players that play in the following positions
    WR, QB, RB, DT and DE. Make a list of these players using Quattro pro.

    How many ways can this be achieved if :

    a) No restrictions
    b) Your main quarterback must be in the group.
    c) The group of 5 must have at least two offensive players.
    d) One player from each position must be represented in the group of leaders.
    e) Find the probability that all of your leaders are defensive players
    f) Find the odds that all of your leaders are offensive.