09/05/2012 You have 20 minutes to finish this quiz.

A survey was conducted asking 200 randomly chosen Purdue students what sports they enjoyed among football, basketball and hockey. The results are summarized below.

20 students said they like none of the sports listed.
30 students said they like all of the sports listed.
55 students like both football and basketball.
65 students like both basketball and hockey.
110 students like basketball.
95 students like hockey.
100 students like football.
160 students like either football or hockey.

The sample is representative of the student population at Purdue. Answer the following questions. If a decimal answer is not exact, please round to 2 non-zero decimal places.

1. Finish the below Venn diagram to describe the breakdown. (3 points)

2. What is the probability that a randomly picked student at Purdue likes football or basketball? (2 points)

\[ 1 - \left( \frac{20 + 25}{200} \right) = 0.78 \]

3. What is the probability that a randomly picked student at Purdue likes neither football nor hockey? (3 points)

\[ \frac{20 + 20}{200} = 0.2 \]

(1) A is an event, and S is sample space. Then \( P(A) = \frac{N(A)}{N(S)} \); \( P(A) = 1 - P(A^C) \)

(2) A, B are events. \( P(A|B) = \frac{P(A \cap B)}{P(B)} \). A and B are independent if and only if \( P(A \cap B) = P(A) \cdot P(B) \)

(3) \( P(A \cup B) = P(A) + P(B) - P(A \cap B) \); \( (A \cup B)^C = A^C \cap B^C \); \( (A \cap B)^C = A^C \cup B^C \)
Suppose in the 2012 season, the New York Jets will either start Mark Sanchez, Tim Tebow, or Greg McElroy as quarterback for each game. Assume that if the Jets start Mark Sanchez, they have 0.6 probability of winning the game. If they start Tim Tebow, they have 0.6 probability of losing the game. If they start Greg McElroy, their losing probability is 4 times as much as that for winning. The Jets coach will start Mark Sanchez with probability 0.7, and Tim Tebow with probability 0.2.

4. Draw a tree diagram to describe this situation. (3 points)

```
  0.7  
   \  /  
  /   \ 0.6 
//    //   \  
0.2   0.4 
  |   /  
 0.6 /   \ 0.4
  |  /   |
 0.1 /     \ 
  |    /  
 0.2 /  \ 0.8
  |   |
 0.1 |
```

5. Given the Jets lose the game, what is the probability that they started Tim Tebow as quarterback? (3 points)

\[
P(Tim \mid lose) = \frac{P(Tim \text{ and } lose)}{P(lose)} = \frac{(0.2)(0.6)}{(0.7)(0.4) + (0.2)(0.6) + (0.1)(0.8)}
\]

\[= 0.57\]

6. Knowing the Jets won the game, what is the chance they started Mark Sanchez or Tim Tebow in this game? (3 points)

\[
P(Mark \text{ or } Tim \mid win) = \frac{P(\text{Mark or Tim and win})}{P(win)}
\]

\[= \frac{(0.7)(0.6) + (0.2)(0.4)}{(0.7)(0.6) + (0.2)(0.4) + (0.1)(0.8)} = 0.96\]

7. Is starting Tim Tebow independent with winning the game? Justify the answer. (3 points)

\[
P(Tim) = 0.2 \\
P(win) = (0.7)(0.6) + (0.2)(0.4) + (0.1)(0.2) = 0.52
\]

\[
P(Tim \text{ and } win) = (0.2)(0.4) = 0.08 \neq P(Tim) \cdot P(win)
\]

So, these two events are not independent.

(1) A is an event, and S is sample space. Then \(P(A) = \frac{n(A)}{n(S)}\); \(P(A) = 1 - P(A^c)\)

(2) A, B are events. \(P(A \mid B) = \frac{P(AnB)}{P(B)}\); A and B are independent if and only if \(P(A \cap B) = P(A) \cdot P(B)\)

(3) \(P(A \cup B) = P(A) + P(B) - P(A \cap B)\); \((A \cup B)^c = A^c \cap B^c\); \((A \cap B)^c = A^c \cup B^c\)
09/05/2012    You have 20 minutes to finish this quiz.

A survey was conducted asking 200 randomly chosen Purdue students what sports they enjoyed among football, basketball and hockey. The results are summarized below.

30 students said they like none of the sports listed.
40 students said they like all of the sports listed.
75 students like both football and basketball.
55 students like both basketball and hockey.
110 students like basketball.
130 students like football.
85 students like hockey.
150 students like either football or hockey.

The sample is representative of the student population at Purdue. Answer the following questions. If a decimal answer is not exact, please round to 2 non-zero decimal places.

1. Finish the below Venn diagram to describe the breakdown. (3 points)

![Venn Diagram](image)

2. What is the probability that a randomly picked student at Purdue likes football or basketball? (2 points)

\[ 1 - \frac{35}{200} = 0.825 \]

3. What is the probability that a randomly picked student at Purdue likes neither football nor hockey? (3 points)

\[ \frac{50}{200} = 0.25 \]

(1) A is an event, and S is sample space. Then \( P(A) = \frac{N(A)}{N(S)} \); \( P(A) = 1 - P(A^C) \)

(2) A, B are events. \( P(A|B) = \frac{P(A \cap B)}{P(B)} \); A and B are independent if and only if \( P(A \cap B) = P(A) \cdot P(B) \)

(3) \( P(A \cup B) = P(A) + P(B) - P(A \cap B) \); \( (A \cup B)^C = A^C \cap B^C \); \( (A \cap B)^C = A^C \cup B^C \)
Suppose in the 2012 season, the New York Jets will either start Mark Sanchez, Tim Tebow, or Greg McElroy as quarterback for each game. Assume that if the Jets start Mark Sanchez, they have 0.55 probability of winning the game. If they start Tim Tebow, they have 0.55 probability of losing the game. If they start Greg McElroy, their losing probability is 3 times as much as that for winning. The Jets coach will start Mark Sanchez with probability 0.75, and Tim Tebow with probability 0.22.

4. Draw a tree diagram to describe this situation. (3 points)

5. Given the Jets lose the game, what is the probability that they started Tim Tebow as quarterback? (3 points)

\[
P(Tim \mid lose) = \frac{P(Tim \text{ and } lose)}{P(lose)} = \frac{(0.22)(0.55)}{(0.75)(0.45) + (0.22)(0.55) + (0.03)(0.75)}
\]

\[= 0.25\]

6. Knowing the Jets won the game, what is the chance they started Mark Sanchez or Tim Tebow in this game? (3 points)

\[
P(\text{Mark or Tim} \mid win) = \frac{P(\text{Mark or Tim} \text{ and win})}{P(win)} = \frac{(0.75)(0.55) + (0.22)(0.45)}{(0.75)(0.55) + (0.22)(0.45) + (0.03)(0.25)}
\]

\[= 0.99\]

7. Is starting Tim Tebow independent with winning the game? Justify the answer. (3 points)

\[
P(Tim) = 0.22 \quad P(win) = (0.75)(0.55) + (0.22)(0.45) + (0.03)(0.25)
\]

\[= 0.519\]

\[
P(Tim \text{ and win}) = (0.22)(0.45) = 0.099 \neq P(Tim) \cdot P(win)
\]

So, these two events are not independent.

(1) A is an event, and S is sample space. Then \(P(A) = \frac{N(A)}{N(S)}; \ P(A^c) = 1 - P(A)\)

(2) A, B are events. \(P(A \mid B) = \frac{P(A \cap B)}{P(B)}\); A and B are independent if and only if \(P(A \cap B) = P(A) \cdot P(B)\)

(3) \(P(A \cup B) = P(A) + P(B) - P(A \cap B); \ (A \cup B)^c = A^c \cap B^c; \ (A \cap B)^c = A^c \cup B^c\)
You have 20 minutes to finish this quiz.

A survey was conducted asking 200 randomly chosen Purdue students what sports they enjoyed among football, basketball, and hockey. The results are summarized below.

- 10 students said they like none of the sports listed.
- 50 students said they like all of the sports listed.
- 85 students like both football and basketball.
- 70 students like both basketball and hockey.
- 130 students like basketball.
- 120 students like football.
- 100 students like hockey.
- 165 students like either football or hockey.

The sample is representative of the student population at Purdue. Answer the following questions. If a decimal answer is not exact, please round to 2 non-zero decimal places.

1. Finish the below Venn diagram to describe the breakdown. (3 points)

   ![Venn Diagram]

2. What is the probability that a randomly picked student at Purdue likes football or basketball? (2 points)

   \[
   1 - \left( \frac{10 + 25}{200} \right) = 0.825
   \]

3. What is the probability that a randomly picked student at Purdue likes neither football nor hockey? (3 points)

   \[
   \frac{35}{200} = 0.175
   \]

(1) A is an event, and \( S \) is sample space. Then \( P(A) = \frac{N(A)}{N(S)} \); \( P(A) = 1 - P(A^C) \)

(2) A, B are events. \( P(A|B) = \frac{P(A \cap B)}{P(B)} \); A and B are independent if and only if \( P(A \cap B) = P(A) \cdot P(B) \)

(3) \( P(A \cup B) = P(A) + P(B) - P(A \cap B) \); \((A \cup B)^C = A^C \cap B^C \); \((A \cap B)^C = A^C \cup B^C \)
Suppose in the 2012 season, the New York Jets will either start Mark Sanchez, Tim Tebow, or Greg McElroy as quarterback for each game. Assume that if the Jets start Mark Sanchez, they have 0.58 probability of winning the game. If they start Tim Tebow, they have 0.58 probability of losing the game. If they start Greg McElroy, their losing probability is 9 times as much as that for winning. The Jets coach will start Mark Sanchez with probability 0.65, and Tim Tebow with probability 0.25.

4. Draw a tree diagram to describe this situation. (3 points)

5. Given the Jets lose the game, what is the probability that they started Tim Tebow as quarterback? (3 points)

\[
P(Tim | lose) = \frac{P(Tim \ and \ lose)}{P(lose)} = \frac{(0.25) \cdot (0.58)}{(0.65) \cdot (0.42) + (0.25) \cdot (0.58) + (0.1) \cdot 0.42} = 0.29
\]

6. Knowing that Jets won the game, what is the chance that they started Mark Sanchez or Tim Tebow in this game? (3 points)

\[
P(Mark \ or \ Tim \ | \ win) = \frac{P[(Mark \ or \ Tim) \ and \ win]}{P(win)} = \frac{(0.65) \cdot (0.58) + (0.25) \cdot (0.42)}{(0.65) \cdot (0.58) + (0.25) \cdot (0.42) + (0.1) \cdot 0.42} = 0.98
\]

7. Is starting Tim Tebow independent with winning the game? Justify the answer. (3 points)

\[
P(Tim) = 0.25 \quad P(win) = (0.65) \cdot (0.58) + (0.25) \cdot (0.42) + (0.1) \cdot (0.42) = 0.75 \quad P(Tim \ and \ win) = (0.25) \cdot (0.42) = 0.105 \neq P(Tim) \cdot P(win)
\]

(1) A is an event, and S is sample space. Then \(P(A) = \frac{N(A)}{N(S)}\); \(P(A) = 1 - P(A^c)\)

(2) A, B are events. \(P(A \mid B) = \frac{P(AB)}{P(B)}\); A and B are independent if and only if \(P(A \cap B) = P(A) \cdot P(B)\)

(3) \(P(A \cup B) = P(A) + P(B) - P(A \cap B)\); \((A \cup B)^c = A^c \cap B^c\); \((A \cap B)^c = A^c \cup B^c\)
Stat 225 - Quiz 1

09/05/2012 You have 20 minutes to finish this quiz.

A survey was conducted asking 200 randomly chosen Purdue students what sports they enjoyed among football, basketball and hockey. The results are summarized below.

15 students said they like none of the sports listed.
55 students said they like all of the sports listed.
85 students like both football and basketball.
80 students like both basketball and hockey.
130 students like basketball.
130 students like football.
115 students like hockey.
165 students like either football or hockey.

The sample is representative of the student population at Purdue. Answer the following questions. If a decimal answer is not exact, please round to 2 non-zero decimal places.

1. Finish the below Venn diagram to describe the breakdown. (3 points)

![Venn Diagram]

2. What is the probability that a randomly picked student at Purdue likes football or basketball? (2 points)

\[
\frac{10 + 15}{200} = 0.075
\]

3. What is the probability that a randomly picked student at Purdue likes neither football nor hockey? (3 points)

\[
\frac{35}{200} = 0.175
\]

(1) A is an event, and S is sample space. Then \( P(A) = \frac{N(A)}{N(S)} \); \( P(A) = 1 - P(A^c) \)

(2) A, B are events. \( P(A \cap B) = \frac{P(A \cap B)}{P(B)} \). A and B are independent if and only if \( P(A \cap B) = P(A) \cdot P(B) \)

(3) \( P(A \cup B) = P(A) + P(B) - P(A \cap B) \); \( (A \cup B)^c = A^c \cap B^c \); \( (A \cap B)^c = A^c \cup B^c \)
Suppose in the 2012 season, the New York Jets will either start Mark Sanchez, Tim Tebow, or Greg McElroy as quarterback for each game. Assume that if the Jets start Mark Sanchez, they have 0.53 probability of winning the game. If they start Tim Tebow, they have 0.53 probability of losing the game. If they start Greg McElroy, their losing probability is 4 times as much as that for winning. The Jets coach will start Mark Sanchez with probability 0.8, and Tim Tebow with probability 0.18.

4. Draw a tree diagram to describe this situation. (3 points)

\[
\begin{aligned}
\text{Mark} &\quad & 0.53 & \text{win} \\
&\text{Tim} & & 0.47 & \text{win} \\
&\text{Greg} & & 0.2 & \text{win} \\
& & & 0.18 & \text{lose} \\
& & & 0.53 & \text{lose} \\
& & & 0.02 & \text{lose} \\
\end{aligned}
\]

5. Given the Jets lose the game, what is the probability that they started Tim Tebow as quarterback? (3 points)

\[
P(\text{Tim} | \text{lose}) = \frac{P(\text{Tim and lose})}{P(\text{lose})} = \frac{(0.18)(0.53)}{(0.8)(0.47) + (0.18)(0.53) + (0.02)(0.8)}
\]

\[
= 0.2
\]

6. Knowing that Jets won the game, what is the chance that they started Mark Sanchez or Tim Tebow in this game? (3 points)

\[
P(\text{Mark or Tim | win}) = \frac{P(\text{Mark or Tim and win})}{P(\text{win})} = \frac{(0.8)(0.53) + (0.18)(0.47)}{(0.8)(0.53) + (0.18)(0.47) + (0.02)(0.2)}
\]

\[
= 0.99
\]

7. Is starting Tim Tebow independent with winning the game? Justify the answer. (3 points)

\[
P(\text{Tim} \cap \text{win}) = (0.18)(0.47) = 0.0846
\]

\[
P(\text{win}) = (0.8)(0.53) + (0.18)(0.47) + (0.02)(0.2) = 0.5126
\]

Since \( P(\text{Tim and win}) \neq P(\text{Tim}) \cdot P(\text{win}) \), these two events are not independent.

(1) A is an event, and S is sample space. Then \( P(A) = \frac{N(A)}{N(S)} \); \( P(A) = 1 - P(A^c) \)

(2) A, B are events. \( P(A|B) = \frac{P(A \cap B)}{P(B)} \); A and B are independent if and only if \( P(A \cap B) = P(A) \cdot P(B) \)

(3) \( P(A \cup B) = P(A) + P(B) - P(A \cap B) \); \( (A \cup B)^c = A^c \cap B^c \); \( (A \cap B)^c = A^c \cup B^c \)