Name: TAYLOR'S VERSION Student ID: :)

ECON 0150 | Exam 2 | Fall 2024

This Exam will take roughly 30 minutes with a quick break to follow. Exam are designed to both test your knowledge and challenge you to apply familiar concepts in new environments. Treat it as if you're trying to show me that you understand the material. Answer clearly, completely, and concisely.

6 pts
1:: incorrect
0:: blank

1. If two equally likely events A and B are mutually exclusive and equally likely, then the probability that event A occurs is 0.5.

TRUE (FALSE)

We don't know if $P(A) + P(B) = 1$. If $P(A) = P(B) = 0.2$, and if they are mutually exclusive, then $P(A) + P(B) = 0.4$.

6 pts
1:: incorrect
0:: blank

2. If events A and B are mutually exclusive and $P(A) + P(B) = 1$, then they are independent.

TRUE (FALSE)

They are independent if $P(A \text{ and } B) = P(A) \cdot P(B)$. If they are mutually exclusive, then $P(A \text{ and } B) = 0$.

6 pts
1:: incorrect
0:: blank

3. Suppose that Taylor wants the True/False answers of Q1-Q3 to *seem* random. He flips a coin and writes the question so that it's answer is True when the coin comes up heads, and False when its tails. But to make sure the answers *seem* random, he changes the results to make sure that "True" is not the correct answer to all three questions.

Assess the following statement: "The answers to Q1-Q3 are independent."

TRUE (FALSE)

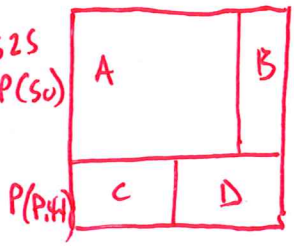
If the first two are TRUE, then the last one must be FALSE. So they are not independent.

4. Students at the University of Pittsburgh and Syracuse University must register in one (and only one) of two programs, economics or psudoscience. Among all students across the two universities, 80% study economics, 65% attend Syracuse University, and 5% are psudoscience students at the University of Pittsburgh.

16 pts
16:: correct
15:: small math error
8:: tried to find $P(SU \mid E) = \frac{A}{A+C}$ but incorrect process
8:: correctly found $P(SU \mid E)$
2:: incorrect
0:: blank

a. What is the probability that a randomly selected student attends Syracuse University and is not studying psudoscience?

$P(E) = 0.8$ $P(PS) = 0.2$



$P(SU \text{ and } E) = A = 0.65 - 0.15 = 0.5$

$P(SU \mid E) = \frac{A}{A+C} = \frac{0.65 - 0.15}{0.8} = \frac{0.5}{0.8} = 0.625$

$P(E) = 0.8$
$P(PS) = 0.2$
$P(P:H) = 0.35$
$P(SU) = 0.65$
$P(PS \text{ and } P:H) = 0.05$
$B = 0.2 - 0.05 = 0.15$

b. What is the probability that a randomly selected economics student attends the University of Pittsburgh?

15 pts
15:: correct
14:: incorrect, small math error
8:: tried to find $P(P:H \mid E)$ but incorrect process
8:: correctly found $P(P:H \text{ and } E)$
2:: incorrect
0:: blank

$P(P:H \text{ and } E) = C = P(E) - A = 0.8 - 0.5 = 0.3$

$P(P:H \mid E) = \frac{C}{A+C} = \frac{0.3}{0.5+0.3} = 0.375$

* incorrect

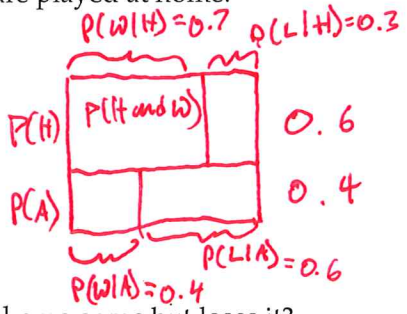
5. A football team plays games either at home or away. The team wins 70% of its home games but only 40% of its away games. In this season, 60% of the games are played at home.

$P(W|H) = 0.7$

$P(W|A) = 0.4$

$P(H) = 0.6$

$P(A) = 0.4$



15 pts

a. What is the probability that the team plays a home game but loses it?

$P(H \text{ and } L) = P(H) \cdot P(L|H) = 0.6 \cdot 0.3 = 0.18$ ← BOTH correct. Similar rubric items to 4b.

$P(L|H) = \frac{P(H \text{ and } L)}{P(H)} = \frac{0.18}{0.6} = 0.3$ ←

15 :: correct
14 :: small math error
2 :: tried to find the correct answer but incorrect process
2 :: incorrect
0 :: blank

15 pts

b. What is the probability that the team wins a game?

$P(W) = P(H) \cdot P(W|H) + P(A) \cdot P(W|A) = 0.6 \cdot 0.7 + 0.4 \cdot 0.4 = 0.58$

Same rubric as 5.a.

15 pts

c. Suppose you see on the internet that the team won. What is the probability that the team played the game at home?

$P(H|W) = \frac{P(H \text{ and } W)}{P(W)} = \frac{0.7 \cdot 0.6}{0.58} = \frac{0.42}{0.58} \approx 0.72$

Same rubric items as 5.a.

6 pts

d. Is the following statement true or false? "The team plays a home game" and "The team wins a game" are independent events.

1 :: incorrect
0 :: blank

TRUE (FALSE)

$P(H \text{ and } W) \stackrel{?}{=} P(H) \cdot P(W)$