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1.0.1 GO Classes 2024 | Weekly Quiz 8 | Conditional Probability | Question: 5<sub>top</sub>

Alice, Bob, and Carl each attempt to solve a crossword puzzle. There is a 70% chance that Alice can solve the puzzle without making a mistake, a 60% chance that Bob can, and a 85% chance that Carl can. What is the probability that each one makes a mistake in solving the puzzle?

- A. 0.018      B. 0.357      C. 0.9      D. 0.12

goclasses2024\_wq8 goclasses probability 1-mark

Answer key

1.0.2 GO Classes 2024 | Weekly Quiz 8 | Conditional Probability | Question: 12<sub>top</sub>

- Class has 50 students
- 20 male ( $M$ ), 25 brown-eyed ( $B$ )

For a randomly chosen student, what is the range of possible values for  $p = P(M \cup B)$ ?

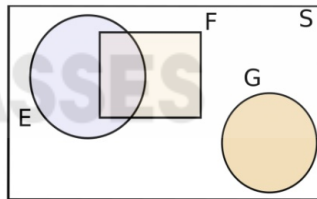
- A.  $p \leq .4$       B.  $.4 \leq p \leq .5$   
 C.  $.4 \leq p \leq .9$       D.  $.5 \leq p \leq .9$

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Answer key

1.0.3 GO Classes 2024 | Weekly Quiz 8 | Conditional Probability | Question: 1<sub>top</sub>

Which all of the following is true for the Venn diagram shown here:



- A.  $P(E \cup G) = P(E) + P(G)$       B.  $P(E \cup G) = P(E) + P(G) - P(E \cap G)$   
 C.  $P(E^C \cap F) = P(F^C) - P(E)$       D.  $P(E^C \cap F) = 1 - (P(F^C) - P(E))$

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Answer key

## 1.1

Conditional Probability (9) <sub>top</sub>1.1.1 Conditional Probability: GO Classes 2024 | Weekly Quiz 8 | Conditional Probability | Question: 10<sub>top</sub>

I have two six-sided dice. The first die has 3 faces painted red and the other 3 painted black. The second has 1 red face and 5 black faces. When I roll a die, each of the six faces are equally likely. I choose a die at random (both dice being equally likely), and roll it twice (rolling the same die both times).

What is the conditional probability that I chose the die with 3 red faces, given that the first roll came up "red"?

- A.  $1/2$       B.  $3/4$       C.  $1/6$       D.  $1/3$

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Answer key

1.1.2 Conditional Probability: GO Classes 2024 | Weekly Quiz 8 | Conditional Probability | Question: 11<sub>top</sub>

A drug-screening test is used in a group of professional baseball players of whom 4% actually use illegal drugs. It is found that the test indicates positive in 97% of those who use drugs and 2% of those who do not.

What is the probability that a randomly chosen player in the group with positive test result actually uses drugs?

- A. 0.67      B. 0.97      C. 0.06      D. 0.52

## Answer key

1.1.3 Conditional Probability: GO Classes 2024 | Weekly Quiz 8 | Conditional Probability | Question: 13<sub>top</sub>

A box contains three coins: two regular coins and one fake two-headed coin ( $P(H) = 1$ ), You pick a coin at random and toss it.



What is the probability that it lands heads up?

- A.  $1/2$       B.  $2/3$       C.  $4/5$       D. None of these

## Answer key

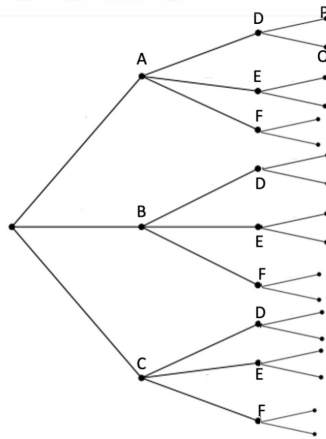
1.1.4 Conditional Probability: GO Classes 2024 | Weekly Quiz 8 | Conditional Probability | Question: 14<sub>top</sub>

Consider a three level tree diagram of events happening in a sequence.

At first level  $A, B$  or  $C$  events are possible, at second level  $D, E$  or  $F$  are possible and at third level  $P$  or  $Q$  are possible.



All edge probabilities at first level are  $1/3$ , at second level are  $1/3$ , and at third level are  $1/2$ .



Find  $P(A | P)$ ?

- A.  $2/3$       B.  $1/3$       C.  $1/2$       D.  $3/4$

## Answer key

1.1.5 Conditional Probability: GO Classes 2024 | Weekly Quiz 8 | Conditional Probability | Question: 3<sub>top</sub>

Suppose that  $k$  events  $B_1, B_2, \dots, B_k$  form a partition of the sample space  $S$ . There is another event  $A$  that  $\Pr(A) > 0$ .



Which of the following is/are CORRECT?

- A.  $\sum_{i=1}^k P(B_i) = 1$       B.  $\sum_{i=1}^k P(B_i | A) = 1$   
 C.  $\sum_{i=1}^k P(A | B_i) = 1$       D.  $\sum_{i=1}^k P(B_i \cap A) = P(A)$

## Answer key

1.1.6 Conditional Probability: GO Classes 2024 | Weekly Quiz 8 | Conditional Probability | Question: 4<sub>top</sub>

$A$  and  $B$  are two events. If  $P(A, B)$  decreases while  $P(A)$  increases, what must be true:



- A.  $P(A | B)$  decreases      B.  $P(B | A)$  decreases  
 C.  $P(B)$  decreases      D. All of above

## Answer key

1.1.7 Conditional Probability: GO Classes 2024 | Weekly Quiz 8 | Conditional Probability | Question: 6<sup>top</sup>



Which of the following(s) expression is/are same as  $P(A, B, C)$  given no independent assumptions.

- A.  $P(C | A, B) \cdot P(A, B)$  B.  $P(C | A, B) \cdot P(A) \cdot P(B)$   
 C.  $P(A | B) \cdot P(B | C) \cdot P(C)$  D.  $P(A | B, C) \cdot P(B | C) \cdot P(C)$

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Answer key

1.1.8 Conditional Probability: GO Classes 2024 | Weekly Quiz 8 | Conditional Probability | Question: 7<sup>top</sup>



Suppose we wish to calculate  $P(H | E_1, E_2)$ , and we have no conditional independence information.

Which of the following sets of numbers are sufficient for the calculations?

- A.  $P(E_1, E_2), P(H), P(E_1 | H), P(E_2 | H)$  B.  $P(E_1, E_2), P(H), P(E_1, E_2 | H)$   
 C.  $P(H), P(E_1 | H), P(E_2 | H)$  D.  $P(H), P(E_1 | H)$

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Answer key

1.1.9 Conditional Probability: GO Classes 2024 | Weekly Quiz 8 | Conditional Probability | Question: 9<sup>top</sup>



Which of the following statements is NOT true?

- A. If  $A \subset B$ , then  $P(A) \leq P(B)$ . B. If  $P(B) > 0$ , then  $P(A | B) \geq P(A)$ .  
 C.  $P(A \cap B) \geq P(A) + P(B) - 1$ . D.  $P(A \cap B^c) = P(A \cup B) - P(B)$ .

goclasses2024\_wq8 goclasses probability conditional-probability 2-marks

Answer key

1.2 Independent Events (3) <sup>top</sup>

1.2.1 Independent Events: GO Classes 2024 | Weekly Quiz 8 | Conditional Probability | Question: 15<sup>top</sup>



For a sample space  $S$  encompassing three events  $E, F$ , and  $G$ , if it is given that  $P(E) = 0.3, P(F) = 0.8, P(G) = 0.2$ , which of the following can NOT be true?

- A. Events  $E$  and  $F$  are mutually exclusive events  
 B. Events  $F$  and  $G$  are mutually exclusive events  
 C. Events  $E$  and  $F$  are independent events  
 D. Events  $F$  and  $G$  are independent events

goclasses2024\_wq8 goclasses probability independent-events 2-marks

Answer key

1.2.2 Independent Events: GO Classes 2024 | Weekly Quiz 8 | Conditional Probability | Question: 2<sup>top</sup>



Which of the following is/are CORRECT?

- A. If events  $E_1$  and  $E_2$  are statistically independent, then

$$P(E_1 \cup E_2) = P(E_1) + P(E_2)$$

- B. If events  $E_1$  and  $E_2$  are mutually exclusive, then

$$P(E_1 | E_2) = 0$$

- C. If  $E_1, E_2$ , and  $E_3$  are mutually exclusive and collectively exhaustive, then

$$P(E_1) = 1 - P(E_2) - P(E_3)$$

- D.  $P(\bar{E}_1 | E_2 \cup E_3) = 1 - P(E_1 | \overline{E_2 \cup E_3})$

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Answer key



Suppose  $A$  and  $B$  are independent events. Consider the following probabilities.

$$\begin{aligned}P(A, B) &= 0.15 \\P(A, B^c) &= 0.45 \\P(A^c, B) &= x \\P(A^c, B^c) &= y\end{aligned}$$

What will be the value of  $x + y$ ?

goclasses2024\_wq8 numerical-answers goclasses probability independent-events 1-mark

Answer key

Answer Keys

1.0.1	A	1.0.2	D	1.0.3	A;B	1.1.1	B	1.1.2	A
1.1.3	B	1.1.4	B	1.1.5	A;B;D	1.1.6	B	1.1.7	A;D
1.1.8	B	1.1.9	B	1.2.1	A	1.2.2	B;C	1.2.3	0.4