Question 1 0.5 points Saved

The 1000 students of a local high school are categorized by their attendance and GPA in the table. Find the probability that a student skipped few classes or has a GPA greater than 3.0.

GPA	< 2.0	2.0–3.0	> 3.0	Total
Many Skipped Classes	80	25	5	110
~~Few Skipped Classes~~	~~175~~	~~450~~	~~265~~	890
Total	255	475	270	1000

Find $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

Given: $P(A) = \frac{890}{1000} = 0.89$

$P(B) = \frac{270}{1000} = 0.27$

$P(A \cap B) = \frac{265}{1000} = 0.265$

$\therefore P(A \cup B) = 0.89 + 0.27 - 0.265 = \boxed{0.895}$

Question 2

Events A and B are complements. Which statement is false?

- Ω is partitioned into 2 parts so that $A \cup B = \Omega$
- A and B are disjoint. $P(\Omega) = P(A \cup B) = P(A) + P(B) = 1$
- $P(A) = 1 - P(B)$ or $P(B) = 1 - P(A)$

$\therefore$ A and B have a non-empty intersection is false.

Question 3

A\B = A when A and B are disjoint.

∴ false

$A \setminus B = A - A \cap B$

When A and B are disjoint, then their intersect is empty.

So, $A \setminus B = A - A \cap B = A - \emptyset = A$

Question 4

Given that A = {1, 2, 4, 5, 8, 9, 10} and B = {3, 6, 7, 8, 10, 14}, determine A∪B :

$A \cup B = 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 14$

Question 5

Given that A = {1, 2, 4, 5, 8, 9, 10} and B = {3, 6, 7, 8, 10, 14}, determine A\B :

$A \setminus B = 1, 2, 4, 5, 9$

Question 6

Given A = {1, 2, 4, 5, 8, 9, 10} and B = {3, 6, 7, 8, 10, 14}. Suppose C = A∩B and D = A∪B. Find D\C :

$C = A \cap B = 8, 10$

$D = A \cup B = 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 14$

$D \setminus C = D - C = 1, 2, 3, 4, 5, 6, 7, 9, 14$

Question 7

1 points Save Answer

Among employees of a certain company, 60% know C/C++, 50% know R, 30% know both languages, and 20% know neither language. Let A = "knows C/C++" and B = "knows R". What is the probability that a randomly chosen employee knows R but not C/C++ ? Write your answer as a decimal (e.g., write 0.32, not 32%).

$P(A) = 0.6$

$P(B) = 0.5$

$P(A \cap B) = 0.3$

$P(A^c \cap B^c) = 0.2$

Find: $P(B \cap A^c)$

$$P(B \cap A^c) = P(B) \cdot P(A^c)$$
$$= 0.5 \times 0.4$$
$$= 0.2$$

Question 8

1 points Save Answer

Among employees of a certain company, 60% know C/C++, 50% know R, 30% know both languages, and 20% know neither language. Let A = "knows C/C++" and B = "knows R". What is the probability that a randomly chosen employee does not know C/C++ ? Write your answer as a decimal (e.g., Write 0.32, not 32%).

$$P(C^c) = 1 - P(C)$$
$$= 1 - 0.6$$
$$= 0.4$$

Question 9

1 points Save Ans

Among employees of a certain company, 60% know C/C++, 50% know R, 30% know both languages, and 20% know neither language. Assume independence of events. Let A = "knows C/C++" and B = "knows R". What is the probability that an employee knows at least one of the languages? Write your answer as a decimal (e.g., Write 0.32, not 32%).

$$P(\text{know at least 1}) = 1 - P(\text{none})$$
$$= 1 - 0.2$$
$$= 0.8$$

Question 10 0.5 po

If P(A) = 0.4, P(B) = 0.2, and P(A and B) = 0, which of the following is true?

- A. Events A and B are independent and mutually exclusive.
- B. Events A and B are independent but not mutually exclusive.
- C. Events A and B are mutually exclusive but not independent. ◉
- D. Events A and B are neither independent nor mutually exclusive.
- E. Events A and B are independent but whether A and B are mutually exclusive cannot be determined from the given information.

• If $P(A \cap B) = 0$, A and B are mutually exclusive.

Check: $P(A \cap B) = P(A) \cdot P(B)$

$0 = (0.4)(0.2)$

$0 \neq 0.08$

∴ A and B are not independent

Question 11 0.5 po

If P(A) = 0.4, P(B) = 0.1, and P(A and B) = 0.08, which of the following is true?

- A. Events A and B are independent and mutually exclusive.
- B. Events A and B are independent but not mutually exclusive. ◉
- C. Events A and B are mutually exclusive but not independent.
- D. Events A and B are neither independent nor mutually exclusive.
- E. Events A and B are independent but whether A and B are mutually exclusive cannot be determined from the given information.

∴ Since $P(A \cap B) \neq 0$, A and B aren't mutually exclusive.

Check: $P(A \cap B) = P(A) \cdot P(B)$

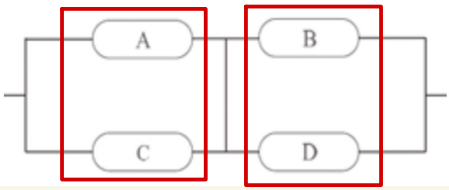
$0.08 = 0.4 \times 0.1$

$0.08 = 0.04$

∴ A and B are not independent

Question 12 1 points

Calcaulate the reliability of the system if all components function properly with probability 0.95. [Hint: A,B and C,D are not in sequel. Start with parallel components!]



$$P(E) = 1 - P(\text{none work})$$
$$= 1 - P(A^c \cap C^c)$$
$$= 1 - P(A^c) \cdot P(C^c)$$
$$= 1 - (0.05)(0.05)$$
$$= 0.9975$$

$$P(F) = P(E) = 0.9975$$

$$R = P(E \cap F)$$
$$= P(E) \cap P(F)$$
$$= (0.9975)(0.9975)$$
$$= 0.995$$

Question 6 1 points Save Answ

Among employees of a certain company, 60% know C/C++, 50% know R, 30% know both languages, and 20% know neither language. Let A = "knows C/C++" and B = "knows R". What is the probability that a randomly chosen employee knows C/C++ or they know R? Write your answer as a decimal (e.g., Write 0.32, not 32%).

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$
$$= 0.6 + 0.5 - 0.3$$
$$= 0.8$$

Question 7 0.5 points Save Answer

The 1000 students of a local high school are categorized by their attendance and GPA in the table. Find the probability that a student skipped few classes or has a GPA less than 2.0.

GPA	< 2.0	2.0–3.0	> 3.0	Total
Many Skipped Classes	80	25	5	110
Few Skipped Classes	175	450	265	890
Total	255	475	270	1000

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$= \frac{890}{1000} + \frac{255}{1000} - \frac{175}{1000}$$

$$= 0.89 + 0.255 - 0.175$$

$$= 0.97$$