

ASSIGNMENT: Algebraic Probability

DIRECTIONS: Substitution is one of our strategies for solving systems of equations. When we have multiple variables across multiple equations, we can substitute common variables to try and solve. We will work this to our advantage to solve probability problems.

1. [Maximum mark: 6]

Consider the events A and B , where $P(A) = \frac{2}{5}$, $P(B) = \frac{1}{4}$ and $P(A \cup B) = \frac{7}{8}$.

(a) Write down $P(B)$.

(b) Find $P(A \cap B)$.

(c) Find $P(A|B)$.

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2.) Let A and B be events such that $P(A) = \frac{1}{2}$, $P(B) = \frac{3}{4}$ and $P(A \cup B) = \frac{7}{8}$.

(a) Calculate $P(A \cap B)$.

(b) Calculate $P(A|B)$.

(c) Are the events A and B independent? Give a reason for your answer.

3. [Maximum mark: 7]

Let A and B be events such that $P(A) = 0.6$, $P(A \cup B) = 0.8$ and $P(A | B) = 0.6$.

- a. Show that $P(A \cap B) = P(B) - 0.2$ [3 marks]
- b. Find $P(B)$. [3 marks]
- c. Are event A and B independent? Explain your reason [1 mark]

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4.) Given that events A and B are independent with $P(A \cap B) = 0.3$ and $P(A \cap B^c) = 0.3$, find $P(A \cup B)$.

[4 marks]

5.5	Probability of an event A	$P(A) = \frac{n(A)}{n(U)}$
	Complementary events	$P(A) + P(A^c) = 1$
5.6	Combined events	$P(A \cup B) = P(A) + P(B) - P(A \cap B)$
	Mutually exclusive events	$P(A \cup B) = P(A) + P(B)$
	Conditional probability	$P(A \cap B) = P(A)P(B A)$
	Independent events	$P(A \cap B) = P(A)P(B)$

NAME: _____

DATE: 08/24A-25B/2017

1.)

2.) .375; .5; Yes

3.) a: Use substitution to prove the equivalence

b: 0.5 [use substitution and $P(A \cap B) = P(B)P(A|B)$]

c: Yes [solve for $P(A \cap B)$ using substitution, then use independence formula]

4.) $P(A \cup B) = 0.8$