

AP Statistics - Conditional Probability and Independence - Worksheet

Common Core AP STAT 4.5, AP STAT 4.6, HSS-CP.A.2, HSS-CP.A.3, HSS-CP.A.4, HSS-CP.B.6, HSS-CP.B.8 · maths-pdf.fr/en/

Name: _____ Class: _____ Date: ____/____/____

These 20 problems practice AP Statistics topics 4.5 and 4.6. You will compute conditional probabilities from tables and trees, use the multiplication rule, test for independence, and solve at-least-one problems.

AP Statistics · Common Core State Standards: **AP STAT 4.5, AP STAT 4.6, HSS-CP.A.2, HSS-CP.A.3, HSS-CP.A.4, HSS-CP.B.6, HSS-CP.B.8**

Exercise 1 - Conditional from a table

Group	Under 30	30 or older	Total
Streams daily	48	22	70
Does not	32	98	130
Total	80	120	200

200 adults by age group and daily streaming.

Use the table of 200 adults. Find $P(\text{streams daily} \mid \text{under 30})$ and $P(\text{under 30} \mid \text{streams daily})$.

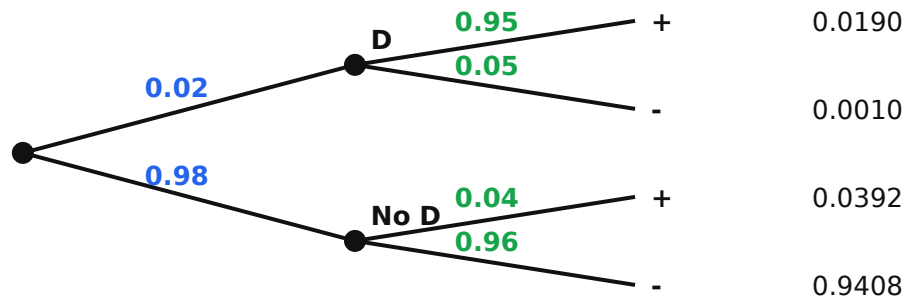
Exercise 2 - Use the formula

$P(A) = 0.5$, $P(B) = 0.4$, and $P(A \text{ and } B) = 0.2$. Find $P(A \mid B)$ and $P(B \mid A)$.

Exercise 3 - General multiplication rule

A bag has 6 red and 4 blue marbles. Two are drawn without replacement. Find $P(\text{both red})$.

Exercise 4 - Tree diagram



Tree diagram for a medical test.

A disease affects 2% of a population. A test is positive for 95% of people with the disease and 4% of people without it. Find $P(\text{positive})$.

Exercise 5 - Reverse conditional

Using the same test, find $P(\text{has the disease} \mid \text{positive result})$.

Exercise 6 - Independence check

$P(A) = 0.30$, $P(B) = 0.50$, $P(A \text{ and } B) = 0.15$. Are A and B independent?

Exercise 7 - Independent events

Two independent events have $P(A) = 0.6$ and $P(B) = 0.25$. Find $P(A \text{ and } B)$ and $P(A \text{ or } B)$.

Exercise 8 - Exclusive vs independent

A and B are mutually exclusive with $P(A) = 0.3$ and $P(B) = 0.4$. Are they independent? Explain.

Exercise 9 - At least one

Each of 3 independent free throws is made with probability 0.8. Find the probability of making at least one.

Exercise 10 - Table independence

Result	Tutored	Not tutored	Total
Passed	30	20	50
Failed	10	40	50
Total	40	60	100

Tutoring and passing.

Are passing and being tutored independent? Compare $P(\text{passed})$ with $P(\text{passed} | \text{tutored})$.

Exercise 11 - Without replacement

Three cards are drawn without replacement from a standard deck. Find the probability that all three are hearts.

Exercise 12 - Interpret a conditional

$P(\text{late} | \text{rain}) = 0.35$ and $P(\text{late}) = 0.12$. Interpret both and say whether lateness and rain are independent.

Exercise 13 - Pets

Cat	Own dog	No dog	Total
Own cat	12	18	30
No cat	28	42	70
Total	40	60	100

Pet ownership.

Test whether owning a cat and owning a dog are independent in this sample of households.

Exercise 14 - Conditional with a tree

A factory has two machines. Machine A makes 60% of the items with a 2% defect rate; machine B makes 40% with a 5% defect rate. Find $P(\text{defective})$ and $P(\text{machine B} | \text{defective})$.

Exercise 15 - Find $P(B | A)$

$P(A) = 0.45$ and $P(A \text{ and } B) = 0.18$. Find $P(B | A)$ and use it to decide whether $P(B) = 0.4$ means A and B are independent.

Exercise 16 - Quality check

A batch of 10 phones has 3 defective. Two are tested at random without replacement. Find $P(\text{exactly one defective})$.

Exercise 17 - Two tests

A student passes the written test with probability 0.9. Given that she passes the written test, she passes the road test with probability 0.8. Given that she fails the written test, she passes the road test with probability 0.3. Find the probability she passes the road test.

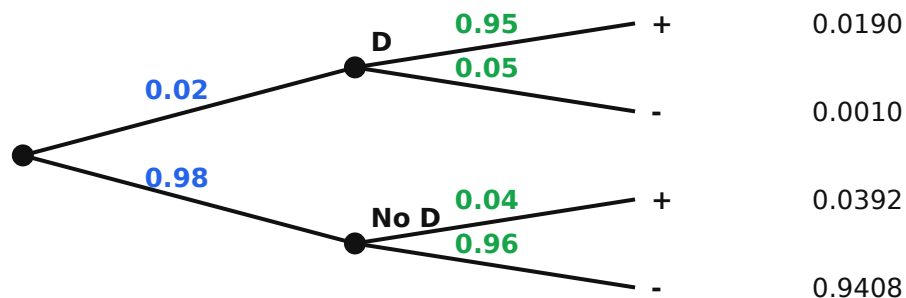
Exercise 18 - Is it independent?

In a class of 30 students, 12 are in band and 18 are not. Of the band students, 9 are juniors; of the 30 students, 15 are juniors. Are being in band and being a junior independent?

Exercise 19 - Multi-step

Of Ethan's emails, 40% are from work. 10% of work emails are marked urgent and 2% of non-work emails are urgent. An email is urgent. Find the probability it is from work.

Exercise 20 - Draw a tree



Tree diagram for a medical test.

A coach picks a player at random from a team where 40% are guards. 30% of guards and 10% of non-guards are left-handed. Using a tree, find the probability the player is left-handed and the probability a left-handed player is a guard.