

Conditional Probability - Questions

June 2016 Mathematics Advanced Paper 1: Statistics 1

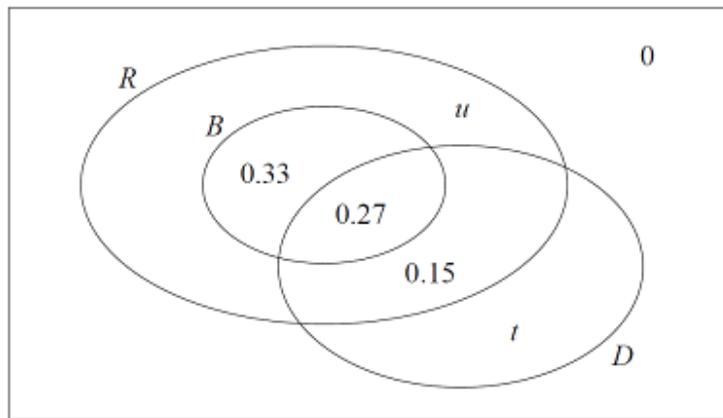
1. 4. The Venn diagram shows the probabilities of customer bookings at Harry's hotel.

R is the event that a customer books a room

B is the event that a customer books breakfast

D is the event that a customer books dinner

u and t are probabilities.



- (a) Write down the probability that a customer books breakfast but does not book a room. (1)

Given that the events B and D are independent,

- (b) find the value of t . (4)

- (c) Hence find the value of u . (2)

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(d) Find

(i) $P(D|R \cap B)$,

(ii) $P(D|R \cap B')$.

(4)

A coach load of 77 customers arrive at Harry's hotel.

Of these 77 customers

40 have booked a room and breakfast

37 have booked a room without breakfast

(e) Estimate how many of these 77 customers will book dinner.

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2.

3. A college has 80 students in Year 12.

20 students study Biology.

28 students study Chemistry.

30 students study Physics.

7 students study both Biology and Chemistry.

11 students study both Chemistry and Physics.

5 students study both Physics and Biology.

3 students study all 3 of these subjects.

(a) Draw a Venn diagram to represent this information.

(5)

A Year 12 student at the college is selected at random.

(b) Find the probability that the student studies Chemistry but not Biology or Physics.

(1)

(c) Find the probability that the student studies Chemistry or Physics or both.

(2)

Given that the student studies Chemistry or Physics or both,

(d) find the probability that the student does not study Biology.

(2)

(e) Determine whether studying Biology and studying Chemistry are statistically independent.

(3)

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3.

8. For the events A and B ,

$$P(A' \cap B) = 0.22 \text{ and } P(A' \cap B') = 0.18$$

(a) Find $P(A)$.

(1)

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

(1)

Given that $P(A | B) = 0.6$,

(c) find $P(A \cap B)$.

(3)

(d) Determine whether or not A and B are independent.

(2)

4.

7. Given that

$$P(A) = 0.35, P(B) = 0.45 \text{ and } P(A \cap B) = 0.13,$$

find

(a) $P(A \cup B)$,

(2)

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

(2)

The event C has $P(C) = 0.20$.

The events A and C are mutually exclusive and the events B and C are independent.

(c) Find $P(B \cap C)$.

(2)

(d) Draw a Venn diagram to illustrate the events A , B and C and the probabilities for each region.

(4)

(e) Find $P([B \cup C]')$.

(2)

5.

4. The Venn diagram in Figure 1 shows the number of students in a class who read any of 3 popular magazines A , B and C .

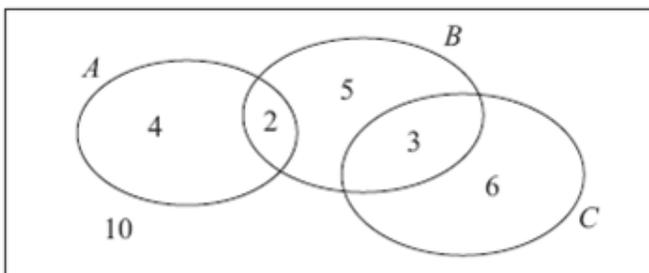


Figure 1

One of these students is selected at random.

- (a) Show that the probability that the student reads more than one magazine is $\frac{1}{8}$. (2)
- (b) Find the probability that the student reads A or B (or both). (2)
- (c) Write down the probability that the student reads both A and C . (1)

Given that the student reads at least one of the magazines,

- (d) find the probability that the student reads C . (2)
- (e) Determine whether or not reading magazine B and reading magazine C are statistically independent. (3)