

Practice for L3 Probability #1

Question One

For two independent events, D and E, the following probabilities are known.

If $P(D) = 0.7$ and $P(E') = 0.4$, find $P(D \cup E)$.

Question Two

The St John's football team recorded the number of goals scored over the season, from none to 4.

The table below gives the frequency for each number of goals scored.

<i>Goals scored</i>	0	1	2	3	4
<i>games</i>	1	2	4	1	2
$P(G = g)$					

- In the space provided complete the probability distribution.
- Find the variance of the number of goals scored per game.

Question Three

The probability that a game is played in the rain is 0.2.

The probability that Xavier scores a goal is 0.25.

The probability that it rains and that Xavier scores a goal is 0.05

- Are the events "Xavier scores a goal" and "the game is played in the rain" independent.

Justify your answer.

- Find the probability that on a fine day Xavier does not score a goal.
- Find the probability that it was raining if Xavier did not score.

Question Four

A group of seven students from Year 9 and nine students from Year 10 have put their names down for a tramp. Only eight students can go.

If those that go are selected randomly, what is the probability that there are four Year 9 and four Years 10 students?

Answers: Practice for L3 Probability #1

1. $P(E') = 0.4$, so $P(E) = 0.6$. $P(D) = 0.7$, independent, so $P(D \cap E) = 0.7 \times 0.6 = 0.42$
 from formula sheet: $P(D \cup E) = P(D) + P(E) - P(D \cap E) = 0.7 + 0.6 - 0.42 = 0.88$

2. a)

g	0	1	2	3	4
games	1	2	4	1	2
$P(G = g)$	0.1	0.2	0.4	0.1	0.2

- b) $E(G) = 0 \times 0.1 + 1 \times 0.2 + 2 \times 0.4 + 3 \times 0.1 + 4 \times 0.2 = 2.1$
 $E(G^2) = 0^2 \times 0.1 + 1^2 \times 0.2 + 2^2 \times 0.4 + 3^2 \times 0.1 + 4^2 \times 0.2 = 5.9$
 $\text{Var}(G) = 5.9 - 2.1^2 = 1.49$

- 3.

	Rain	Fine	
X scores	0.05	0.2	0.25
X does not score	0.15	0.6	0.75
	0.2	0.8	1

- a) If $X = \text{"Xavier Scores"}$ and $R = \text{"weather wet"}$; $P(X).P(R) = 0.25 \times 0.2 = 0.05$
 $P(X \cap R) = 0.05 = P(X).P(R)$, so the events **are** independent.

- b) 0.6 (from table)

- c) $0.15 \div 0.75 = 0.2$ (as independent, can be taken automatically)

4. $\frac{{}^7C_4 \times {}^9C_4}{{}^{16}C_8} = \frac{4410}{12870} = 0.0.3427$