

Problem 1: Mark the following T (true) or F (false):

- (a) F: One need only record a few trials to be able to create a chart of probabilities and make accurate predictions.
- (b) F: Random phenomenon are outcomes that one cannot use probability arguments to predict possible outcomes.
- (c) T: Independent trials are events where one outcome does not influence any of the others.
- (d) T: All probabilities are between 0 and 1.
- (e) F: Disjoint events are independent.

Problem 2: Krystina likes to cheat at dice games so she always brings a weighted dice. Her foul dice has the following probabilities:

Value	1	2	3	4	5	6
Probability	0.10	0.25	0.20	0.05	0.15	0.25

- (a) Complete the table above, i.e. find the probability of rolling a 4.

$$P(4) = 1 - 0.10 - 0.25 - 0.20 - 0.15 - 0.25 = 0.05$$

- (b) What is the probability of rolling a 1 or a 5, i.e. what is $P(1 \text{ or } 5)$?

$$P(1 \text{ or } 5) = P(1) + P(5) = 0.10 + 0.15 = 0.25$$

- (c) What is the probability of rolling a 2 or a 6, i.e. what is $P(2 \text{ or } 6)$?

$$P(2 \text{ or } 6) = P(2) + P(6) = 0.25 + 0.25 = 0.50$$

- (d) What is the probability of *not* rolling a 3, i.e. what is $P(\text{not } 3)$?

$$P(\text{not } 3) = 1 - P(3) = 1 - 0.20 = 0.80$$

- (e) What is the probability of rolling a 7? What about the probability of rolling a 2 *and* a 3?

$$P(7) = 0. \quad P(2 \text{ and } 3) = 0. \quad [\text{You only roll the die once.}]$$

- (f) The probability of the sum of two rolls being 10?

$$P(\text{sum } 10) = P(5 \text{ and } 5) + P(4 \text{ and } 6) = 0.15 \cdot 0.15 + 2 \cdot 0.05 \cdot 0.25 = 0.0225 + 0.025 = 0.0475$$

Problem 3: Given that A and B are independent events with $P(A) = 0.7$ and $P(B) = 0.4$, find the following:

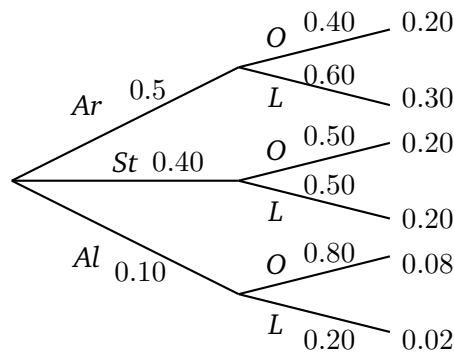
(a) $P(A \text{ and } B) = P(A) \cdot P(B) = 0.7 \cdot 0.4 = 0.28$

(b) $P(B | A) = \frac{P(A \text{ and } B)}{P(A)} = \frac{0.28}{0.7} = 0.4$. [No surprise, B is independent from A .

(c) $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B) = 0.7 + 0.4 - 0.28 = 0.82$

Problem 4: There are three airlines to get from Mayberry to Pawnee: Artin Lines, Stewart Air, or Albowitz Flights. If you take Artin, there is a 60% chance your flight will be late, 50% if you take Stewart, and a 20% chance that you will be late if you take Albowitz. However, Artin services 50% of the flights from Mayberry to Pawnee, Stewart handles 40% of the flights, while Albowitz handles only 10% of the flights.

(a) Draw a diagram illustrating the possible outcomes.



(b) What is the probability that you took a flight from Mayberry to Pawnee and were late? What is the probability that you were both late and took Albowitz?

$$P(\text{late}) = 0.30 + 0.20 + 0.02 = 0.52. \quad P(\text{late and Albowitz}) = 0.02$$

(c) If you took a flight from Pawnee to Mayberry and the flight was on time, what was the probability that it was Stewart?

$$P(\text{Stewart} | \text{on time}) = \frac{0.20}{0.20 + 0.20 + 0.08} = \frac{0.20}{0.48} = 0.4167$$

Problem 5: Real estate ads suggest that 64% of homes for sale have garages, 21% have swimming pools, and 17% have both features.

(a) Find the probability that a home for sale has a garage or a swimming pool.

$$\frac{47 + 17 + 4}{100} = \frac{68}{100} = 0.68$$

(b) Find the probability that it has neither a swimming pool nor a garage.

$$\frac{32}{100} = 0.32$$

(c) Find the probability that a randomly chosen home has a pool but not a garage.

$$\frac{4}{100} = 0.04$$

(d) If a randomly chosen house has a garage, what is the probability that it also has a pool?

$$\frac{17}{47 + 17} = \frac{17}{64} = 0.2656$$

