

Exercise walk-through

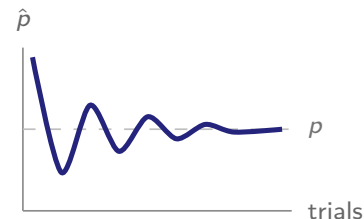
4.3

Introduction to Probability

AP Statistics

What we will cover

- 1 Randomness and probability
- 2 Probability rules
- 3 Conditional and independence
- 4 Random variables
- 5 Combining variables
- 6 Binomial and geometric



Randomness and probability

Probability is the long-run
relative frequency of an
outcome.

- short runs vary by
chance
- **simulation** estimates a
hard probability

Law of large numbers : more trials
 $\Rightarrow \hat{p}$ settles toward the true
 p .



Playing cards

Conditional probability and independence

A **conditional probability** restricts
to the times B happens:

$$P(A \mid B) = \frac{P(A \cap B)}{P(B)}$$

The **multiplication rule** :

$P(A \cap B) = P(A) P(B \mid A)$. The chance of A **once you know** B happened. Two-way tables make these easy: restrict to B 's row or column, then find A 's share.

Independent : $P(A \mid B) = P(A)$, so $P(A \cap B) = P(A)P(B)$. Not the same as mutually exclusive!

	girl	boy
sport	24	36
none	16	24

$$P(\text{girl} \mid \text{sport}) = \frac{24}{60}$$

Exercises 2.1-2.3

2.1 State the range of any probability.

[1]

2.2 A fair die is rolled. Find $P(\text{rolling a } 4)$.

[1]

2.3 If $P(\text{rain}) = 0.3$, find $P(\text{no rain})$.

[2]

Exercises 2.1-2.3

2.1 State the range of any probability.

[1]

2.1

- between 0 and 1 (inclusive)
-

2.2 A fair die is rolled. Find $P(\text{rolling a 4})$.

[1]

2.2

- $\frac{1}{6} \approx 0.167$
-

2.3 If $P(\text{rain}) = 0.3$, find $P(\text{no rain})$.

[2]

2.3

- $P(\text{no rain}) = 1 - 0.3 = 0.7$

Exercises 3.1-3.2

3.1 The probability of the complement of E is

[1]

☐

A $P(E)$

B $1 - P(E)$

C $1 + P(E)$

D 0

3.2 A probability must be between

[1]

☐

A -1 and 1

B 0 and 1

C 0 and 100

D any two values

Exercises 3.1·3.2

3.1 The probability of the complement of E is

[1]

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A $P(E)$

B $1 - P(E)$

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D 0

3.1 B

- $1 - P(E)$.

3.2 A probability must be between

[1]

☐

A -1 and 1

B 0 and 1

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D any two values

3.2 B

- 0 and 1 .

Exercise 3.3 (a)

3.3 A bag has 3 red and 7 blue balls, drawn at random.

(a) Find $P(\text{red})$.

[2]

Exercise 3.3 (a)

3.3 A bag has 3 red and 7 blue balls, drawn at random.

(a) Find $P(\text{red})$.

[2]

(a)

- $P(\text{red}) = \frac{3}{10} = 0.3$

Exercise 3.3 (b)

3.3 A bag has 3 red and 7 blue balls, drawn at random.

(b) Find $P(\text{not red})$.

[1]

Exercise 3.3 (b)

3.3 A bag has 3 red and 7 blue balls, drawn at random.

(b) Find $P(\text{not red})$.

[1]

(b)

- $1 - 0.3 = 0.7$