# Let's practice!

INTRODUCTION TO STATISTICS

# Discrete distributions

INTRODUCTION TO STATISTICS

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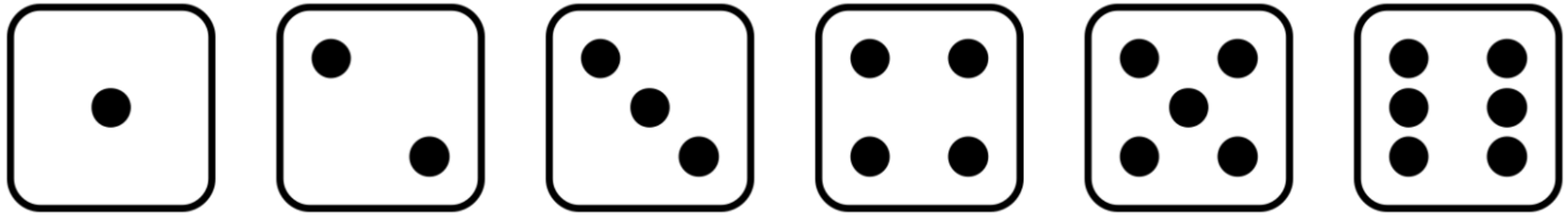
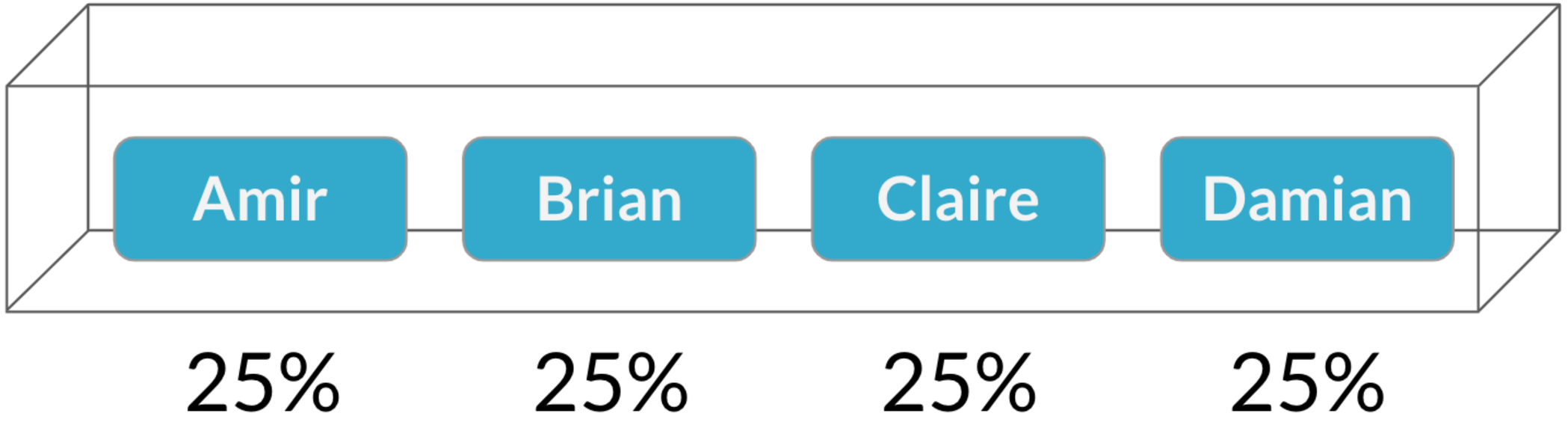
datacamp

# Rolling the dice

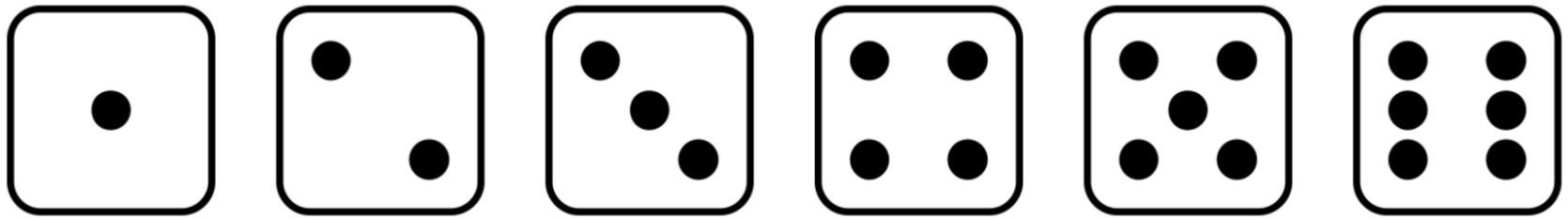


# Choosing salespeople



# Probability distribution

***Describes the probability of each possible outcome in a scenario***




***Expected value***: The ***mean*** of a probability distribution

Expected value of a fair die roll =

$$(1 \times \frac{1}{6}) + (2 \times \frac{1}{6}) + (3 \times \frac{1}{6}) + (4 \times \frac{1}{6}) + (5 \times \frac{1}{6}) + (6 \times \frac{1}{6}) = 3.5$$

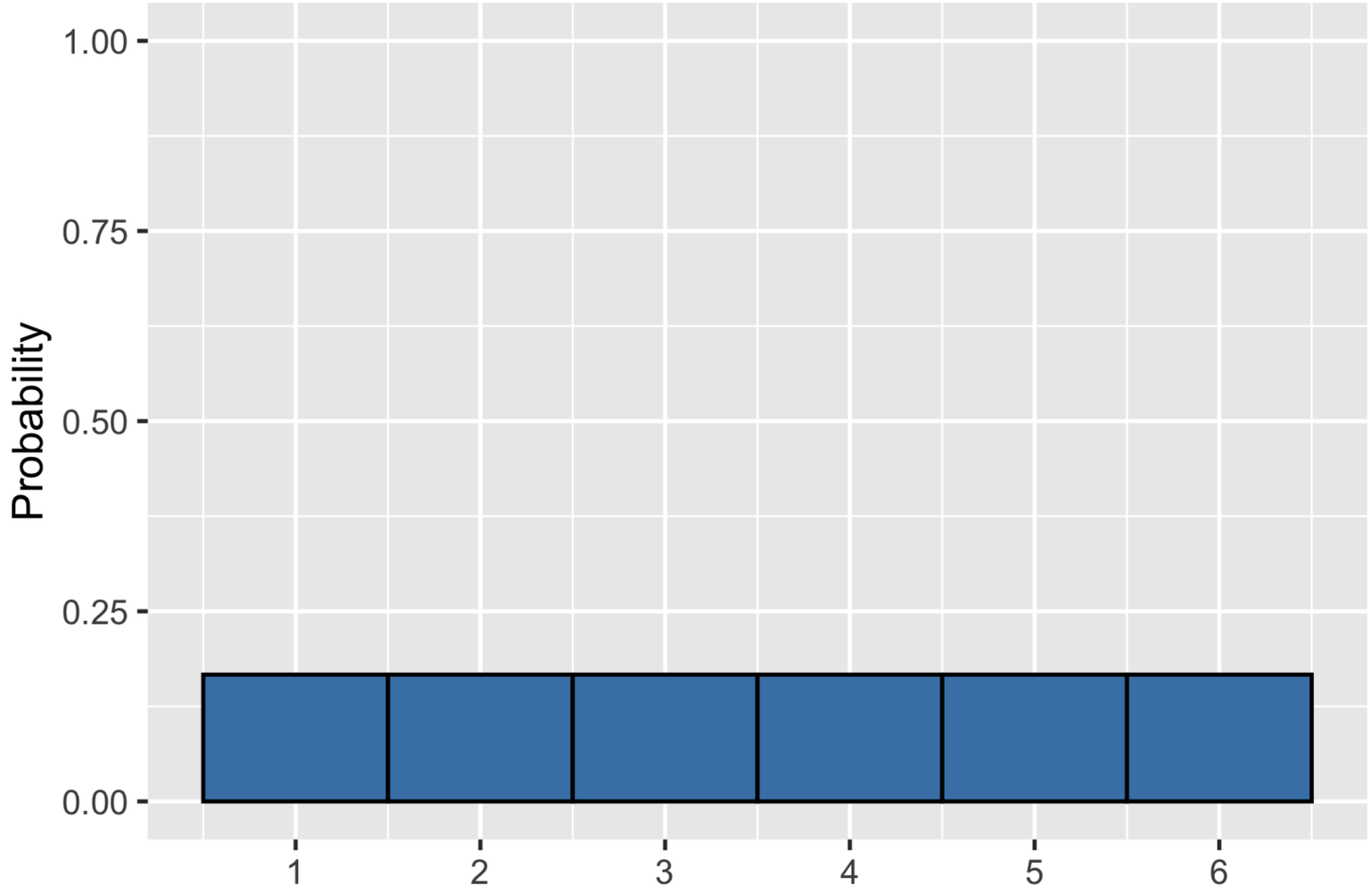
# Why are probability distributions important?

- Help us to quantify risk and inform decision making


- Used extensively in hypothesis testing
  - Probability that the results occurred by chance

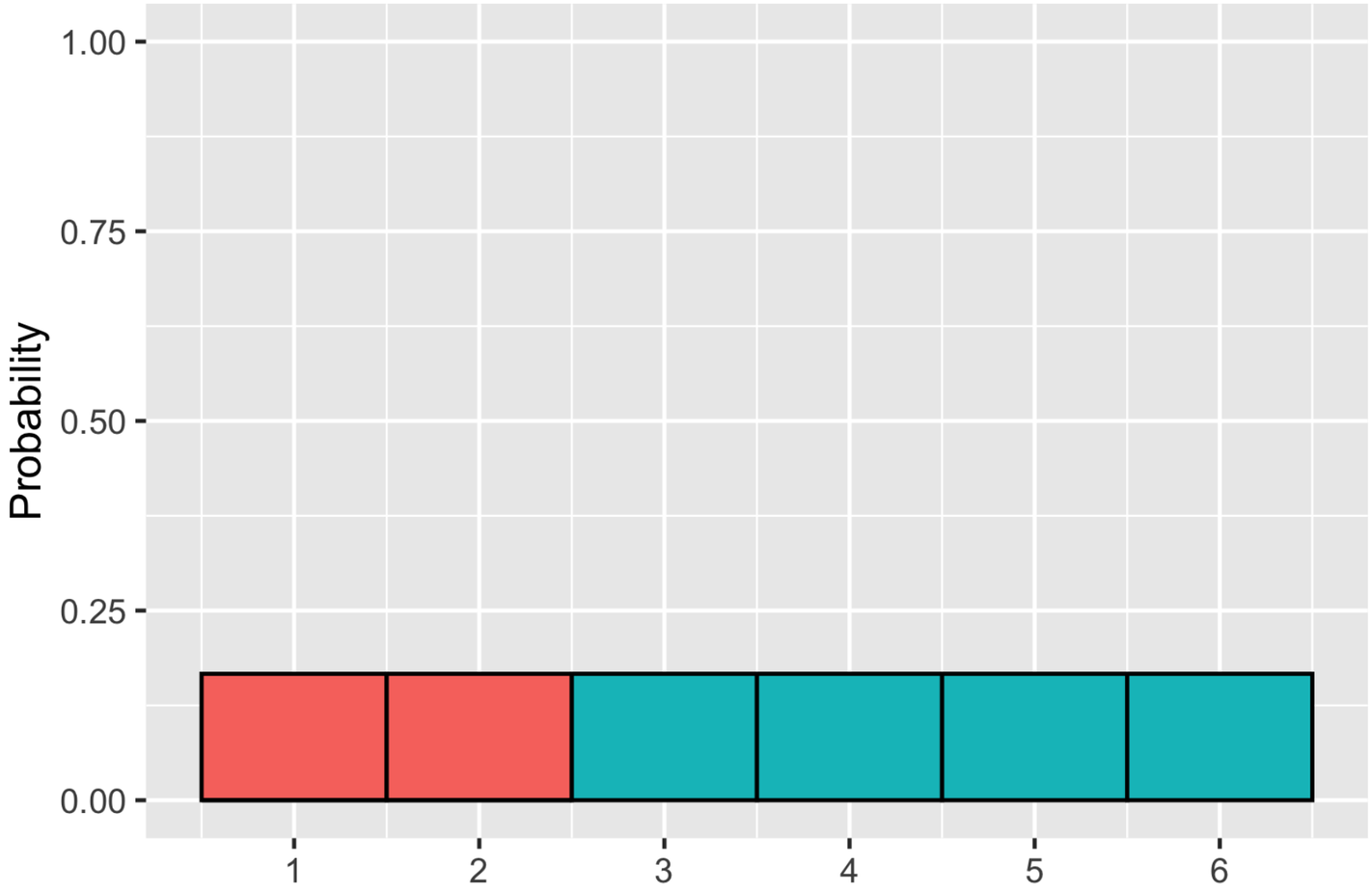
[1] Image credit: https://unsplash.com/@timmossholder

# Visualizing a probability distribution



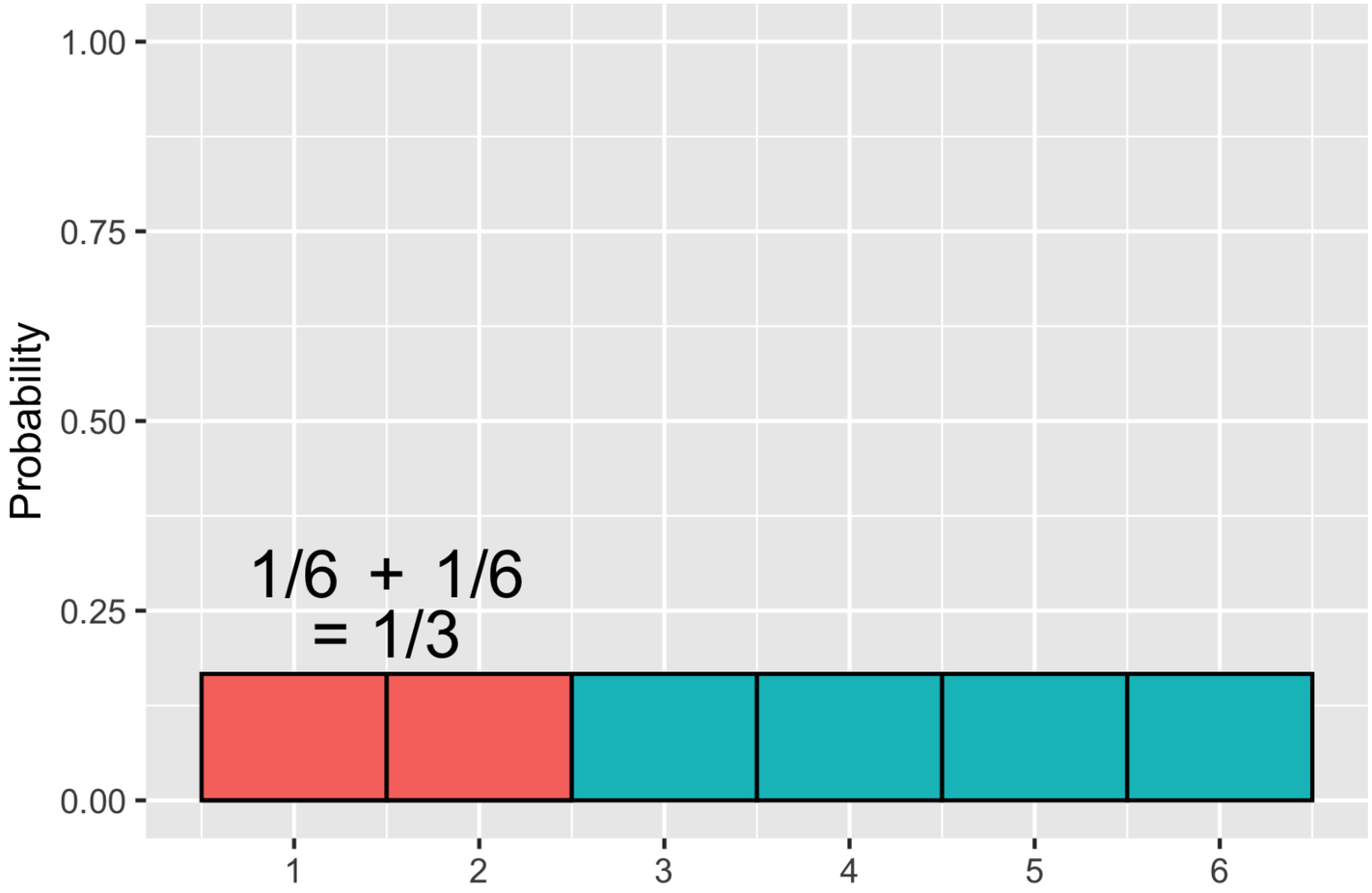
# Probability = area

$$P(\text{die roll}) \leq 2 = ?$$

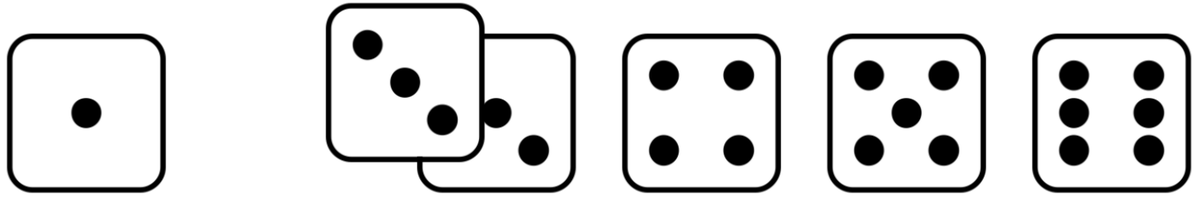


# Probability = area

$$P(\text{die roll}) \leq 2 = 1/3$$



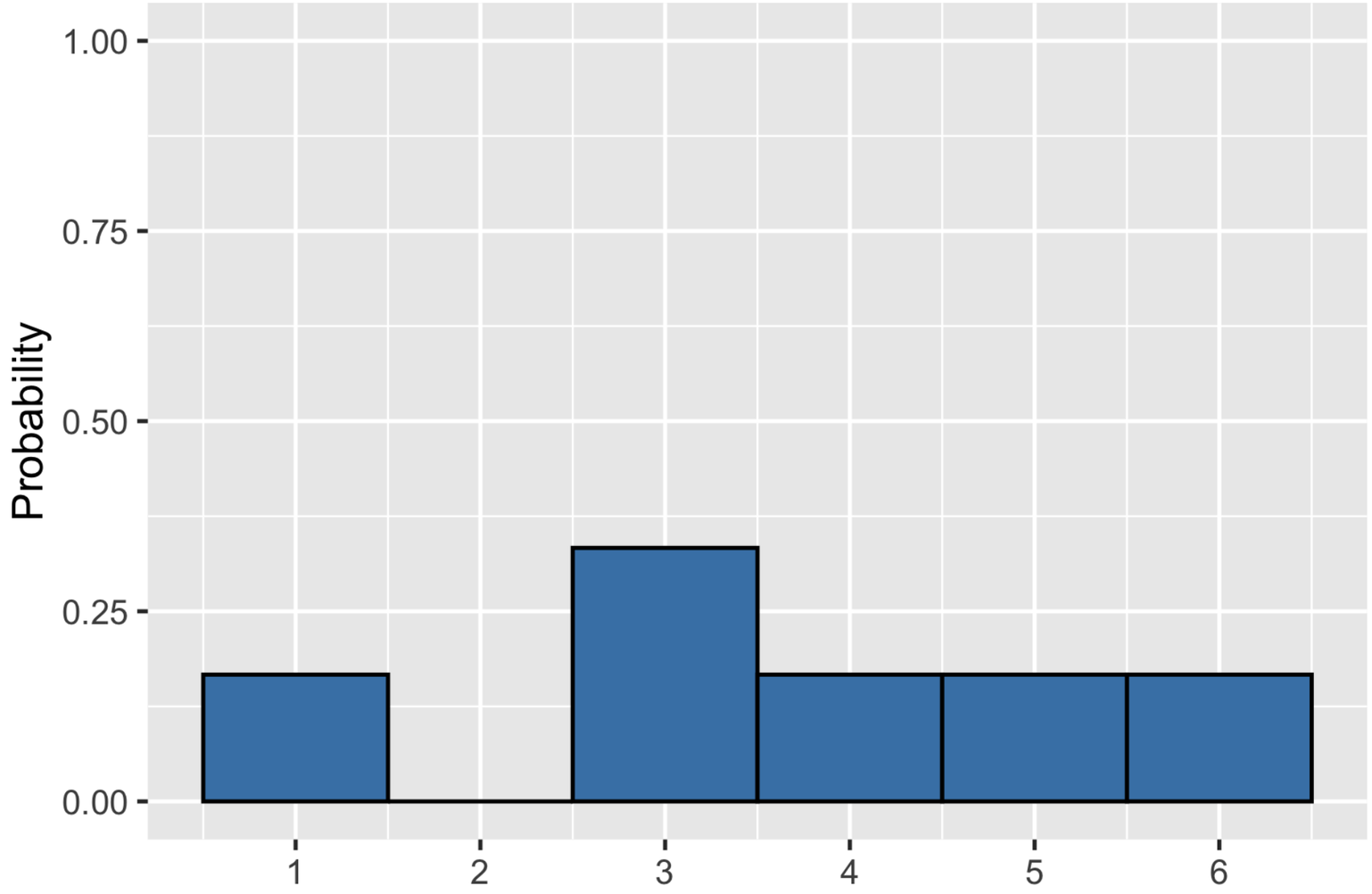
# Uneven die




Expected value of uneven die roll =

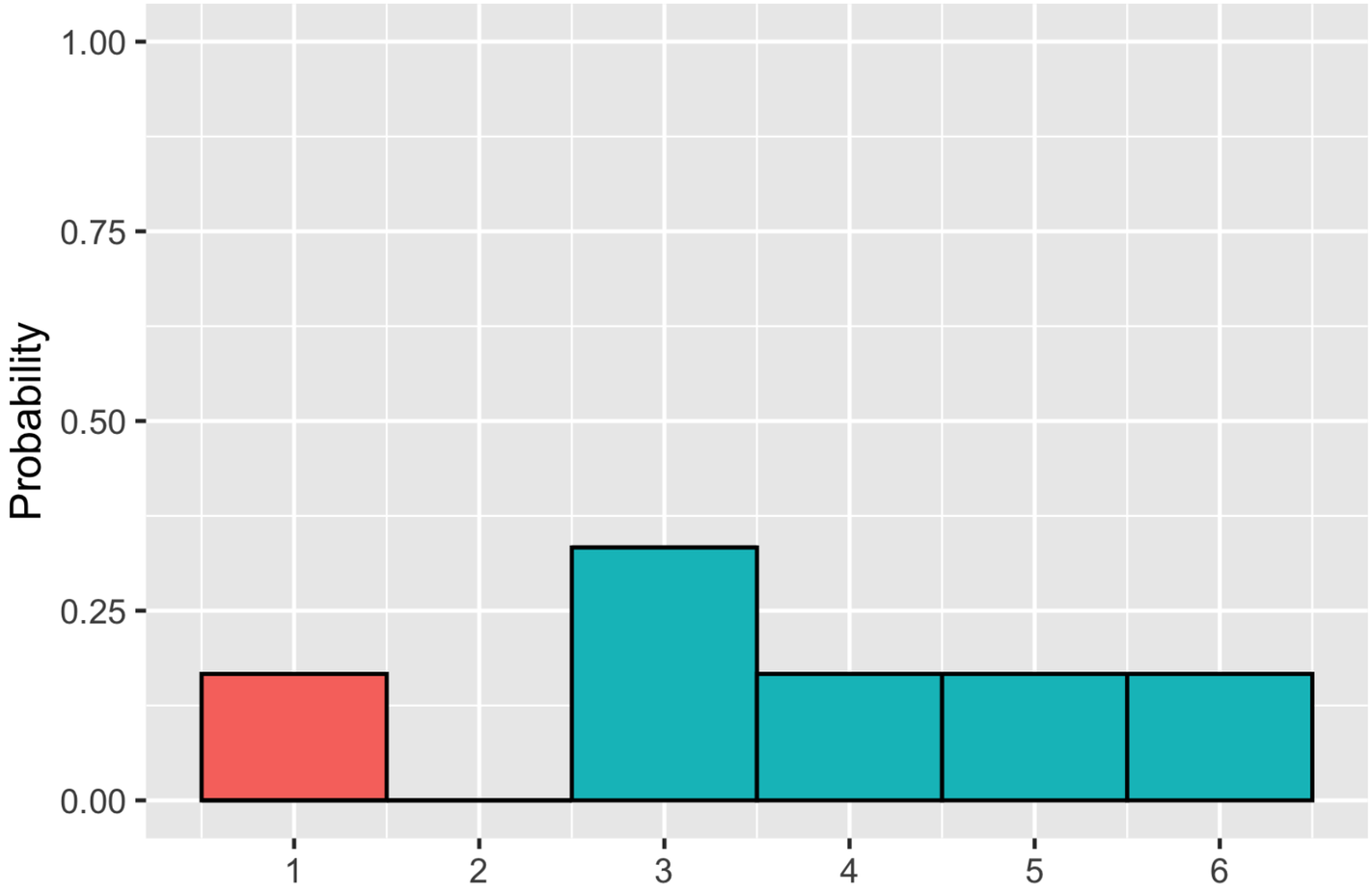
$$(1 \times \frac{1}{6}) + (2 \times 0) + (3 \times \frac{1}{3}) + (4 \times \frac{1}{6}) + (5 \times \frac{1}{6}) + (6 \times \frac{1}{6}) = 3.67$$

# Visualizing uneven probabilities



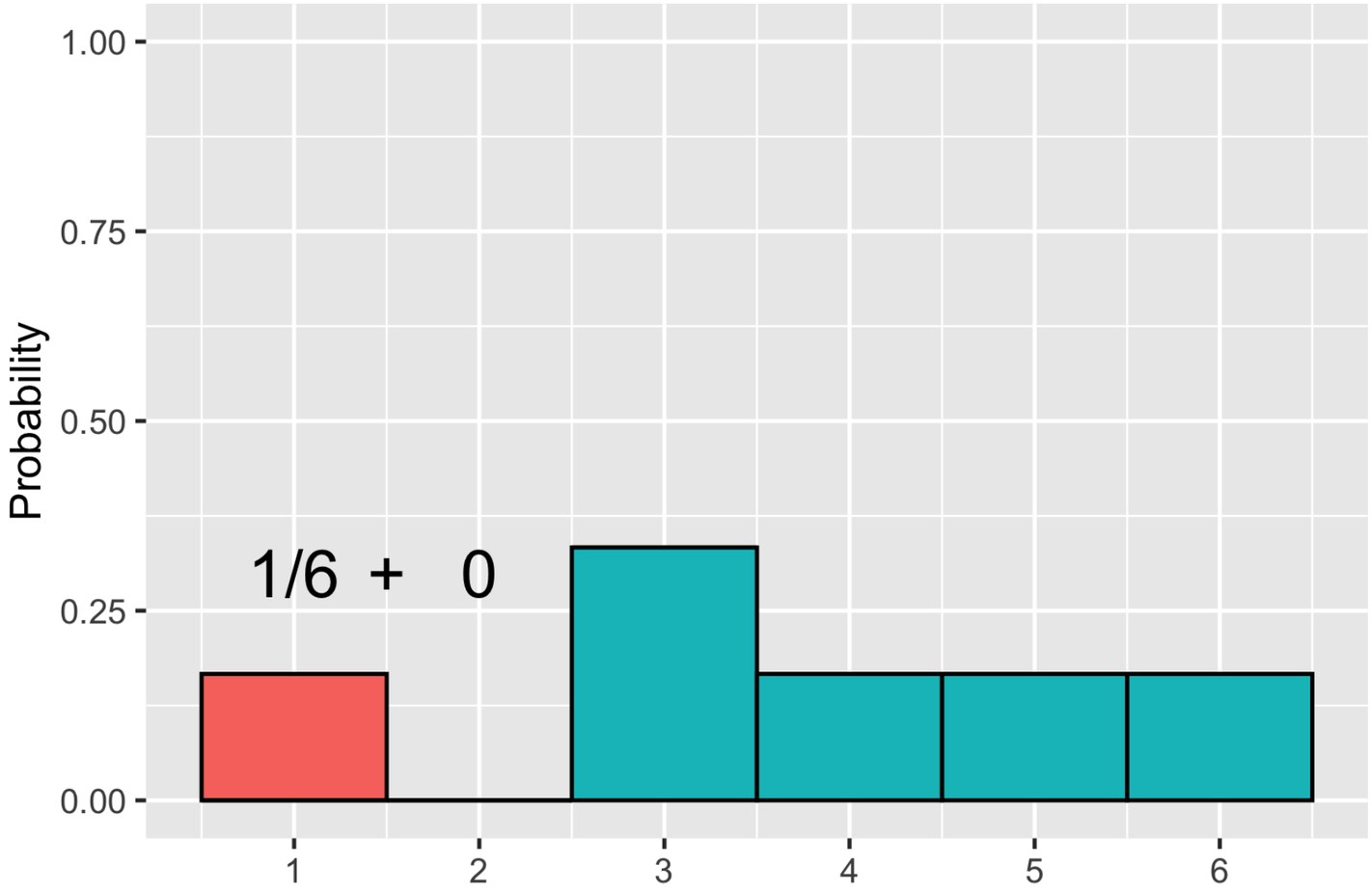
# Adding areas

$$P(\text{uneven die roll}) \leq 2 = ?$$



# Adding areas

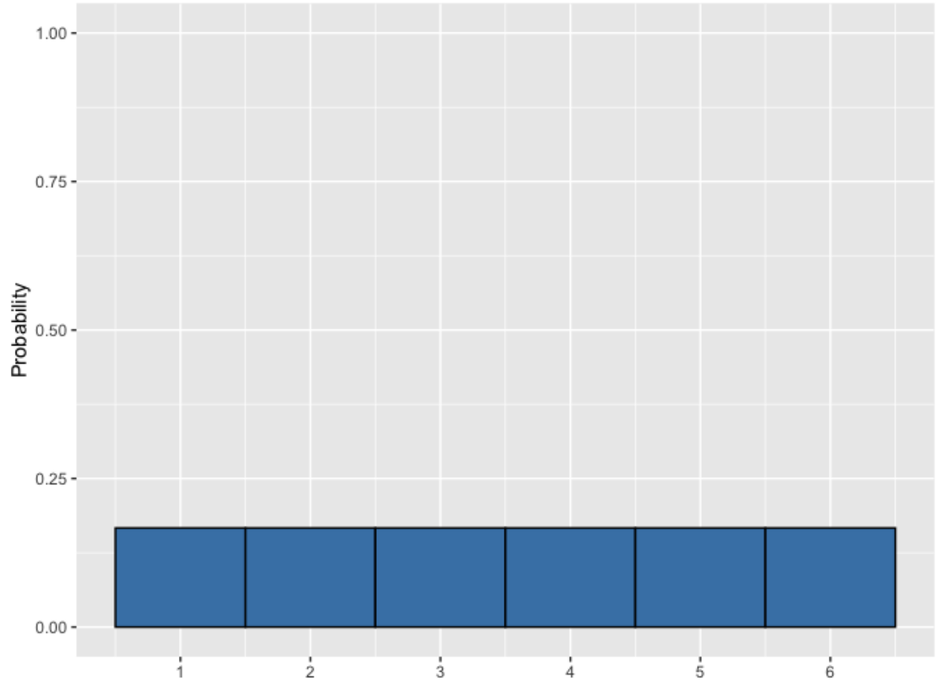
$$P(\text{uneven die roll}) \leq 2 = 1/6$$



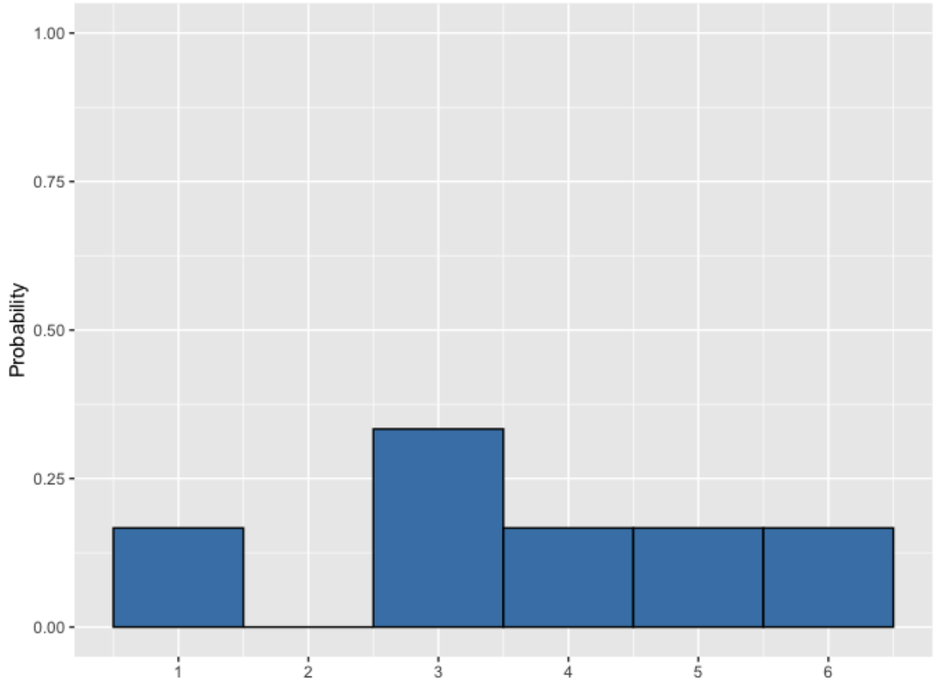
# Discrete probability distributions

***Describe probabilities for discrete outcomes***

## Fair die




## Uneven die




***Discrete uniform distribution***

# Sampling from a discrete distribution

| Roll | Result |
|---|---|
| 1 | 1 |
| 2 | 2 |
| 3 | 3 |
| 4 | 4 |
| 5 | 5 |
| 6 | 6 |

$$Mean = 3.5$$

| Roll | Result |
|---|---|
| 1 | 3 |
| 2 | 1 |
| 3 | 2 |
| 4 | 4 |
| 5 | 6 |
| 6 | 3 |
| 7 | 2 |
| 8 | 2 |
| 9 | 2 |
| 10 | 5 |