The Probabilistic Method

Week 1: Introduction to Probability Theory

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CS49/Math59
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Clicker Question

Let **P** be uniform on **{1, 2, ..., 10}**.
Let **A = {2, 3, 5, 7}** and **B = {1, 3, 5, 7, 9}**.
What is **P[A|B]**?

(A) **2/5**

(B) **1/2**

(C) **3/5**

(D) **3/4**

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Conditional Probability

For **B** ⊆ **Ω** and **w** ∈ **Ω**, the probability of w conditioned on B is

$$P(w|B) = \begin{cases} P(w)/P(B) & \text{if } w \in B \\ 0 & \text{otherwise} \end{cases}$$

Given event **A** ⊆ **Ω,** the probability of **A** conditioned on **B** is
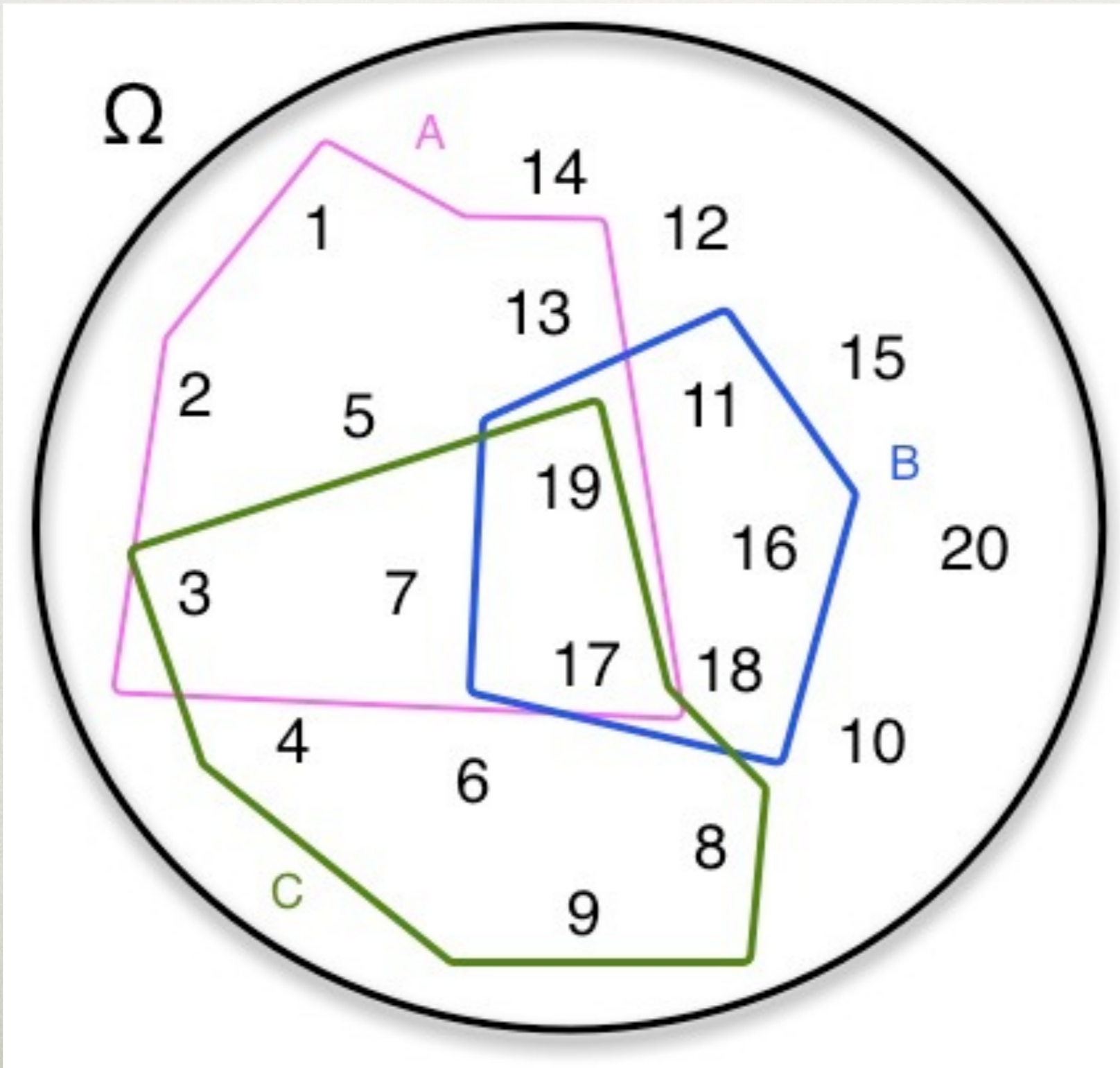
$$P(A|B) = \sum P(w|B)$$

Clicker Exercise

Patients enter a medical clinic when they feel ill. 5% of patients who come in have cancer, and 20% are smokers. By checking records of cancer patients, we know that 50% of cancer patients are smokers.

Suppose a patient enters and is a smoker. What is the probability the patient has cancer?

(A) **5%**

(B) **12.5%**.

(C) **20%**

(D) **50%**.

Independent Events

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