

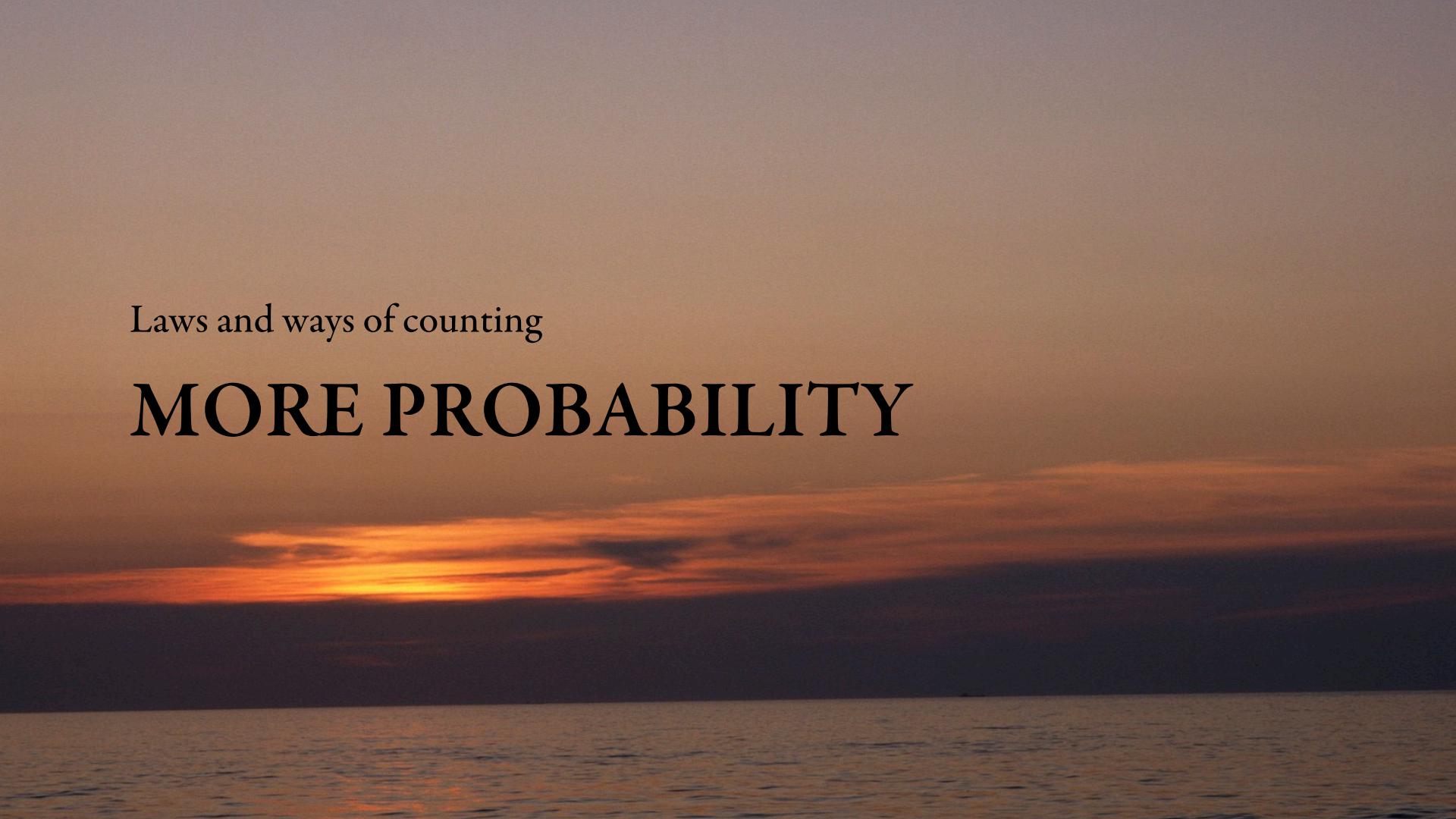


# ASQ CRE Prep course

Lesson II. A. 2. b.

Basic Probability Concepts

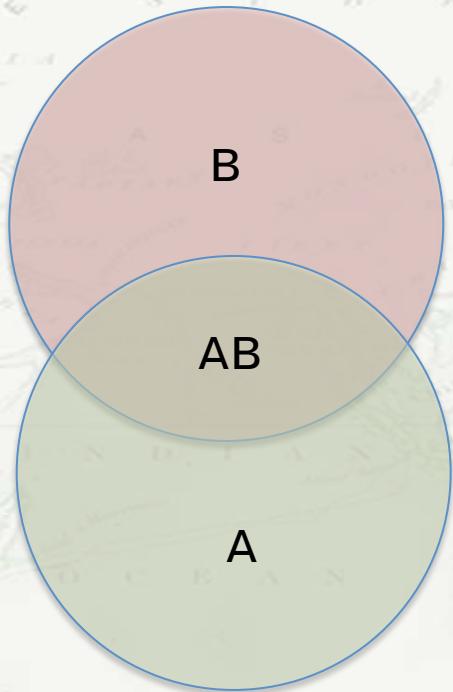
Laws and Counting

A photograph of a sunset over a body of water. The sky is filled with warm, orange, and yellow hues, with darker blue and grey clouds at the bottom. The water in the foreground reflects these colors. The overall atmosphere is peaceful and dramatic.

Laws and ways of counting

# **MORE PROBABILITY**

# Additive Law



$$\begin{aligned}P(A \cup B) &= P(A) + P(B) - P(A \cap B) \\&= 0.65 + 0.65 - (0.65 \times 0.65) \\&= 1.30 - 0.4225 \\&= 0.8775\end{aligned}$$

# Multiplicative Law

$$P(A|B) = \frac{P(A \cap B)}{P(B)}, P(B) \neq 0$$

If events A and B are independent, then

$$P(A|B) = P(A) \times P(B)$$

# Permutations

The number of ways  
that  $n$  distinct objects  
can be **arranged** taking  
them  $r$  at a time is:

$$P_r^n = n(n-1)(n-2)\cdots(n-r+1) = \frac{n!}{(n-r)!}$$

# Combinations

**The number of  
different combinations  
that can be formed  
from  $n$  distinct objects  
taken  $r$  at a time is:**

$$C_r^n = \frac{n!}{r!(n-r)!}$$

When should  
you use  
permutations?



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Expectation