Exercise Walkthrough: Probability of At Least One 'One'

Justin Lanfermann

25. June 2025

1 Overview

2 Step 1: Defining the Probability Space

The Sample Space Ω' five $\Omega = \Omega = \Omega = \Omega$ for $\Omega = \Omega$

 $\Omega' = \Omega^6 = \{(\omega_1, \omega_2, \omega_3, \omega_4, \omega_5, \omega_6) \mid \omega_j \in \Omega \mid (j = 1, \dots, 6)\}$

The Event Space (σ -algebra) \mathcal{A}' 1% $\approx \approx 3$ = 2

 $\mathcal{A}' = \mathcal{P}(\Omega')$

The Probability Measure P 1% $\approx \text{Imposed}$ = Imposed $= \text$

 $P(E) = \frac{|E|}{|\Omega'|} = \frac{|E|}{6^6}$

3 Step 2: Defining the Event of Interest

$$A = \{\omega \in \Omega' \mid \exists j \in \{1, \dots, 6\} \text{ so since } \omega_j = 0\}$$

4 Step 3: Using the Complement Rule

$$A^c = \{ \omega \in \Omega' \mid \forall j \in \{1, \dots, 6\}, \omega_j \neq 0 \}$$

$$P(A) = 1 - P(A^c)$$

5 Step 4: Calculating the Probability of the Complement

6 Step 5: Final Calculation

 $\begin{array}{c} \text{Theom} \\ \text{T$

$$p = P(A) = 1 - P(A^c) = 1 - \left(\frac{5}{6}\right)^6$$

$$p = 1 - \frac{15,625}{46,656} = \frac{46,656 - 15,625}{46,656} = \frac{31,031}{46,656} \approx 0.6651$$

 $\text{ The product of the product of$

Check Your Understanding

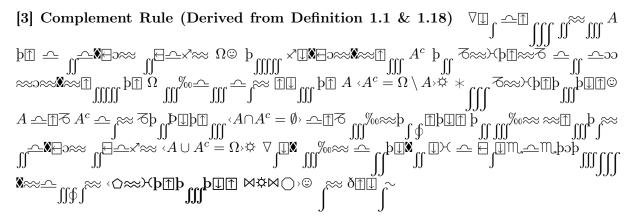
7 Summary and Takeaways

 $\text{Res}_{A} \subseteq \Omega \text{ and the field of the fie$

In-Depth Explanations

[1] Power Set (Definition A.3) $f\% \approx \bigoplus_{i=1}^{\infty} \bigoplus_{i$

 $P(A) = \sum_{\omega \in A} p(\omega) = \sum_{\omega \in A} \frac{1}{|\Omega|} = \frac{|A|}{|\Omega|}$



- $P(\Omega) = 1$
- $\bullet \ \, \forall \text{ if } \sigma \text{ if$
- $\text{for the point of the point$

 $P(A) = 1 - P(A^c)$