Dr. Richard Dell

\[ P(\text{birth occurs at first}) \]
\[ = P(HH) = P(H) \times P(H) \]
\[ = P(H) \times P(H) \]
\[ = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4} \]

So, the null theory is "true" on \( H^* \)

\[ P(\text{all 4 births occur}) = \frac{1}{4} \times \frac{1}{4} = \frac{1}{16} \times \frac{1}{16} \]

It is highly unlikely, therefore, that \( H^* \) is probably false.

**Alternative hypothesis**

This idea is a probability version or proof by contradiction

\[ (A_1 \cup A_2 \cup \ldots \cup A_n) = \bigcup_{i=1}^{n} A_i \]

**Union**

\[ A_1, A_2, \ldots, A_n \] are all in \( C \) then so is \( \bigcup_{i=1}^{n} A_i \)

**For any event \( A \):**

\[ (A')' = A \]

\[ \phi^* = \mathcal{S} \] and \( \mathcal{S}^* = \phi \)

**\( A \cup B = (B \cup A) \)**

**\( A \cup B \cup C = (A \cup B) \cup C = A \cup (B \cup C) \)**

\[ A \cap A \cap \ldots \cap A = \bigcap_{i=1}^{n} A_i \]

**Intersection**

\[ \mathcal{S} = \{s_1, s_2, \ldots, s_n\} \]

**partition of \( S \)**

\[ P(\mathcal{A}) = P(A_1 \text{ and } B_1) + \ldots + P(A_1 \text{ and } B_n) \]

**axiom 1:** for all events \( A \in C, P(A) \geq 0 \)

**axiom 2:** \( P(\emptyset) = 0 \)

**axiom 3:** For disjoint \( A_i \) events \( \sum_{i=1}^{n} P(A_i) \) is the same as \( P(A) \)

**if \( A_i = A_j \) then \( P(A_i) = P(A_j) \) the set \( P(A_i) \) is countable additive.