This infinity; time: Kolmogorov; next partitions; time: permutations & combinations

\[ P(\text{being infected in 100 acts}) \]
\[ = P(1 \text{ or more infected in 100 acts}) \]

\[ B \cap S = T - S \]

\[ P \left( \text{not inf. in 100 acts}\right) \]
\[ = 1 - P(\text{inf. or inf. or inf. \ldots on 1st or 2nd or 3rd \ldots}) \]

\[ = 1 - (1 - \frac{1}{500})^{100} (1 - \frac{1}{500})^{100} \ldots \]
\[ = 1 - (1 - \frac{1}{500})^{100} = 0.18 (1 - \frac{1}{500})^{100} \]

\[ A, B \text{ mutually exclusive iff } P(A \cap B) = 0 \]

A, B independent iff
\[ P(B|A) = P(B) \]
\[ P(A|B) = P(A) \]
\[ P(A \text{ and } B) = P(A) \cdot P(B) \]
If I have an uncountably infinite set of sets, I can make a new set by taking 1 element from each of those sets.

\[ \exists \] is defined to be \{ \theta_1, \ldots, \theta_n \} a partition of \( S' \).
\[ A = (A \cap B_1) \cup (A \cap B_2) \cup \ldots \cup (A \cap B_n) \]

\[ = (A \cap B_1) \lor (A \cap B_2) \lor \ldots \lor (A \cap B_n) \]

\[ P(A) = P \left[ (A \cap B_1) \lor (A \cap B_2) \lor \ldots \lor (A \cap B_n) \right] \]

\[ = P(A \cap B_1) + P(A \cap B_2) + \ldots + P(A \cap B_n) \]

\[ P(A) = \sum_{i=1}^{n} P(A \cap B_i) \]

\[ P(A \cap B_i) = P(B_i) \cdot P(A \mid B_i) \]

\[ P(A) = \sum_{i=1}^{n} P(B_i) \cdot P(A \mid B_i) \]

\text{Law of Total Probability (LTP)}
$p_k (A) : C \rightarrow [0, 1]$ with \( A \) a subset of \( S \)

$A(x) \leftarrow \text{continuous at } 0$

$A(x) \rightarrow \text{discontinuous at } 0$

$x \rightarrow f(x) = x^2$

$A(x)$ if \( A \) is "close" to \( B \)

New: $p(A) = p(B)$

\[
1 - \frac{365!}{272! \cdot 365} \\
1 - \left( \frac{365}{365} \right) \left( \frac{364}{365} \right) \left( \frac{363}{365} \right) \cdots (\cdot) - (\cdot)
\]