

CS70 - Midterm 2 Notes

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Counting

Combinations and Permutations

- Order
 - Matters:
 - Doesn't Matter:
- Replacement
 - With:
 - Without:

Highlight:

Halt Program

Reduction

- Disprove program's existence by reducing to "I can use this program to solve HALT"

Highlight:

Diagonalization

- Listing

Highlight:

Turing Program

-

Highlight:

Probability

Bayes' Rule

- Content

$$\Pr[A|B] = \frac{\Pr[A]\Pr[B|A]}{\Pr[B]} \quad (1)$$

Uses

- Find probability of A given B
- Use Law of Total Probability to find $\Pr[A]$ and $\Pr[B]$ if prior probabilities exist

Product Rule

- Content

$$\Pr[A_1 \cap \dots \cap A_m] = \Pr[A_1] \Pr[A_2|A_1] \dots \Pr[A_m|A_1 \cap \dots \cap A_{m-1}] \quad (2)$$

Law of Total Probabilities

- Probability of event B is equivalent to the sum of the product of each of B 's prior probabilities and the chance of B occurring given that prior probability.

$$\Pr[B] = \Pr[A_1] \Pr[B|A_1] + \dots + \Pr[A_n] \Pr[B|A_n] \quad (3)$$

Uses

- Find denominator for Bayes' Rule problem
- Get probability of any event that has prior probabilities

Bonferroni's Inequalities

- Content

$$\Pr[A \cap B] > \Pr[A] + \Pr[B] - 1 \quad (4)$$

$$\Pr[A_1 \cap \dots \cap A_n] > \Pr[A_1] + \dots + \Pr[A_n] - (n - 1) \quad (5)$$

Uses

- Stuff