Final Topics

Math 105

Summer 2020

- Arguments
  - Prove validity/invalidity with a Venn diagram
  - Convert words to a symbolic expression and vice versa
  - Construct a truth table for a symbolic expression
  - Use De Morgan's laws on logical expressions
  - Prove validity/invalidity with a truth table
- Sets
  - Convert a description of a set to set-builder notation and vice versa
  - Take the union, intersection, and complement of sets
  - Determine if one set is a subset of another
  - Find the cardinality of a set
  - Find the cardinality of a union given the cardinality of the individual sets and their intersection
  - Apply De Morgan's laws to sets
  - Use a Venn diagram and partial information about the sets involved to label the whole diagram
- Combinatorics
  - Use factorials to find the number of ways to arrange objects
  - Use combinations (${}_nC_k$) to find the number of ways to select a subset of objects when order doesn't matter
  - Use permutations (${}_nP_k$) to find the number of ways to select a subset of objects when order does matter
  - Use the fundamental principle of counting to handle multiple combinatorics problems going on at once

- Probability
  - Identify sample spaces and events as sets
  - Find the probability of events directly, using their cardinality and the sample space's
  - Determine if two events are mutually exclusive
  - Find probabilities for groups of random objects (e.g. two dice rolled at once)
  - Find the probability of either one thing happening or another, using the union-intersection rule
  - Find the probability of an event by finding the probability of its compliment
  - Find probabilities that require using combinatorics to find the cardinalities of the event and/or sample space
  - Find the expected value of an action
  - Find the probability of one event, conditional on another (i.e. given that the second one has already happened)
  - Determine when two events are independent