

Name: _____

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FINITE MATH: QUIZ 2

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- The Honor Code is in effect for this quiz. All work must be your own.
- Please turn off all cellphones or any other electronic devices.
- Calculators are NOT allowed.
- You do NOT need to give a numerical value for your answer.
- The quiz lasts 10 minutes.

Useful Formulas

- IE: $n(A \cup B) = n(A) + n(B) - n(A \cap B)$
- CP: $n(A') = n(U) - n(A)$
- $n(A \setminus B) = n(A) - n(A \cap B)$
- $(A \cup B)' = A' \cap B'$
- $(A \cap B)' = A' \cup B'$
- $n! = n \cdot (n-1) \cdot (n-2) \cdots 3 \cdot 2 \cdot 1$
- $P(n, k) = \underbrace{n \cdot (n-1) \cdot (n-2) \cdots (n-k+1)}_{k \text{ factors multiplied}} = \frac{n!}{(n-k)!}$
- Rearrangements with multiplicities: $\frac{n!}{r_1! \cdot r_2! \cdots r_k!}$

Problem 1. Suppose you are counting **binary sequences** of length 6, using only digits 0 and 1. Repeating digits is allowed, so 001010, 100101, and 000000 are all valid.

- a) (1pt) How many such binary sequences are possible?
- b) (1pt) How many start with digit '0'? How many end with digit '0'?
- c) (1pt) How many start with digit '0' AND end with digit '0'? (e.g. 011010)
- d) (2pt) How many start with '0' or end with '0' (or both)? (e.g. 010011, 011010, 111010)

Problem 2. Suppose we have a group of 3 men and 5 women, and we want to **arrange everyone in a single row**. Alexa is one of the women.

- a) (1pt) In how many ways can we do this?
- b) (1pt) What if Alexa insists on being first or last? (Hint: you need to consider each possibility separately, as they are **disjoint** scenarios)
- c) (1pt) What if Alexa does NOT want to be first or last?

Problem 3. (2 pts) In how many ways can we permute the letters in ABRACADABRA?