

Name: _____

June 27, 2017

FINITE MATH: QUIZ 3

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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 compute a numerical value for your answer.
- The bonus question may only bring your score up to a maximum of 10. It is NOT possible to get more than 10 points on this quiz.
- You get 2 points for free.
- 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: $\frac{n!}{r_1! \cdot r_2! \cdots r_k!}$
- $C(n, k) = \binom{n}{k} = \frac{n!}{k!(n-k)!} = \frac{P(n, k)}{k!}$

Problem 1. Consider the set $A = \{1, 2, 3, 4, 5, 6\}$.

- a) (1pt) How many different subsets (of any size) of the set A are there?

- b) (1pt) How many subsets of A have exactly 2 elements?

- c) (1pt) How many subsets of A contain at least one element?

Problem 2. (2pts) We saw in class the following product expansions:

$$(x + y)^0 = 1$$

$$(x + y)^1 = x + y$$

$$(x + y)^2 = x^2 + 2xy + y^2$$

$$(x + y)^3 = x^3 + 3x^2y + 3xy^2 + y^3$$

Write out the product expansion of $(x + y)^5$.

Problem 3. A standard deck of 52 cards has 4 suits, 13 ranks, and 2 colors.

- a) (1pt) How many different poker hands are there? A poker hand has 5 cards.

- b) (1pt) How many poker hands contain all four Aces?

- c) (1pt) How many poker hands contain 2 Spades and 3 Red cards?

- d) (BONUS: 2pts) How many poker hands contain at least one red card?