***Unit 1: Sets and Sets Operations***

**Vocab:**

* **Set:** a well defined collection of objects **EX: 1[, 2, 3, 4}**
* **Element:** an object in a set. **EX: {1},{2}, {3}, or {4}**
* **Union:** all of the elements in both A or B (**∪**)
* **Intersection:** all of the elements in A and B (**∩**)
* **Empty Set:** the set with no elements ( **{ }** )
* **Universal Set:** the set of all elements of interest ( **U =** )
* **Complement:** the set of all elements in the universal set that are not A (A^C)
* **Permutation:** an arrangement of a set of objects in definite order (order matters) **n= terms r= amount chosen** **(nPr)**
* **Combination:** an arrangement of a set of objects without regard to order. EX: **n= terms r= amount chosen (nCr)**

**Concepts to Remember:**

* n(AUB) = n(A)+n(B)-n(A∩B)
* n(AUBUC)=n(A)+n(B)+n(C)-n(A∩B)-n(B∩C)-n(A∩C)+n(A∩B∩C)
* n! = n x (n-1) x (n-2)....3 x 2 x 1
* 0! = 1
* P(n,r) = n!/(n-r)!
* C(n,r)= n!/r!(n-r)!
* Use Venn Diagrams for help when solving

**Math Problems:**

Let U = {1,2,3,4,5,6,7,8} **A** = {1,2,,4,6} **B** = {3,4,5,6} **C** = {2,3,7,8}

1. A ∪ B
2. (A∩B)UC
3. 100 people were interviewed

32 people like Dominos

47 people like Papa Johns

62 people like Pizza Hut

17 like Dominos and Pizza

20 like Pizza Hut and Papa Johns

12 like Dominos and Papa Johns

5 like all three

1. How many liked Dominos and Papa Johns, but not Pizza Hut?
2. How many liked none of the three?
3. How many liked Pizza Hut, but not Dominos or Papa Johns?
4. If n(A) = 20, n(B) = 12, and n(A∩B) = 5, what is (A∪B)?
5. If 20 people enter a room with 25 chairs, how many ways can they be seated?
6. Find the number of distinguishable permutations that can be formed from the letters of each word.
   1. MATHEMATICS
   2. BANANA
7. In order for a student to get a 100% on their math homework they must answer 20 out of the 30 questions given. In how many ways can the student fulfill the requirements?
8. An exam consists of 25 multiple choice questions…
   1. How many ways can a students score a 76? (19 out of 25 correct)
   2. How many ways can a student score at least a 76? (19,20,21,22,23,24 or 25 correct)
9. Subway offers a combo that contains a sandwich, drink, and a bag of chips. If there are 6 different sandwiches, 5 different drinks, and 3 different bags of chips available, how many different combos are possible?
10. Someone forgot the code to their bike lock. The lock can be opened with a 4 digit code, where each digit is a letter A,B,C,D,E or F.
    1. How many codes are possible if each digit can be used more than once?
    2. How many codes are possible if each digit may only be used once?
11. Let U = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}, A = {1, 3, 5, 6, 7}, B = {2, 4, 5, 7, 8}. Find A∩B^C
12. Let M = {3, 6, 8} N = {4, 8, 12} P = {3, 4, 7}
    1. Find MU(N∩P)
    2. Find M∩(NUP)

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