Event=an outcome or defined collection of outcomes of a random experiment
DM 1st Law: (A U B)'=A' n B', DM 2nd Law: (A n B)=A' U B'.
Mutually exclusive = two or more events that cannot occur at the same time. If one of the outcomes occurs, it is not possible for the other event outcome to occur.
Axiom 1: For any event A, P(A) >= 0. Axiom 2: P(Sample Space)=1. Axiom 3: If A_1,A_2, A_3 is an infinite collection of disjoint events, then P(Union of all A's)= Sum of P(a's). P(empty set)=0.
Complement Rule: $P(A) = 1 - P(A')$. Addition Rule: $P(A \cup B) = P(A) + P(B) - P(A \cap B)$.
nPk= n!/(n −k)!. nCk = n!/k!(n-k)!. Condition Prob.: $P(A|B) = P(A \cap B)/P(B)$. $P(A \cap B) = P(A|B)P(B)$. $P(A1 \cap A2 \cap A3) = P(A3|(A1 \cap A2))P(A1 \cap A2) = P(A3|(A1 \cap A2))P(A1|A2)P(A2)$
Bayes' Theorem: $P(A|B) = P(B|A)P(A)/P(B)$
Independent if $P(A|B) = P(A)$, and they are dependent otherwise. $P(A \cap B) = P(A)P(B)$
If AnC & AnB are independent, this does not imply that BnC are independent! Check all.

<u>P(AnB)=P(A)+P(B) – P(AUB).. 3components P(AUBUC)= P(A)+P(B)+P(C) P(AnB)-P(AnC)-P(BnC)+P(AnBnC)</u>… P(AnB')=P(A)-P(AnB)… P(A'nB) =P(B) – P(AnB)…

PROOFS: 1) Write all formulas you know. 2) Substitute!! 3) Look for compliments 4) When in doubt draw a Venn diagram.

If you are trying to count the number of ordered pairs/tuples of objects:

1. Define $n1$,$n2$,...
2. Use the Fundamental Counting Principle ($n1 \times n2 \times$...) n

1. Define n and k

- n is the number of distinct objects
- k is the number of objects selected

2. List out some sample space elements
3. Determine replacement: Can the n objects can be selected more than once per element (with replacement) or not (without replacement)?
4. Determine order: Does the sequence of each element matter (is $\{1,2,3\}$ meaningfully different than $\{2,1,3\}$)?
5. Use the box below to identify the correct counting technique
6. Remember that when you are computing a probability, you should have the same number of things accounted for in the numerator and the denominator.

	Order Matters	Order Does Not Matter	
With replacement	FCP or n^k	$\binom{n+k-1}{k}$	
Without replacement	FCP or ${}_nP_k = \frac{n!}{(n-k)!}$	${}_nC_k = \frac{n!}{k!(n-k)!}$	$n \geq k$