HANDOUT
Types of collections: lists, tuples, permutations, subsets, multi-sets

Definition: When a collection of objects is formed and each element is chosen from a different pool, then the collection is generically called a LIST. In this case, the order of the elements must be specified before the list can be written down (any ordering can be used as long as the ordering is specified).

Example: 3- element list to describe age, eye color, and handedness of a person: (18, brown, left-handed)

Definition: When each element is always chosen from the **same pool**, we distinguish four different types of collections depending on whether order matters and repetition is allowed and are labeled as follows:

SAME POOL (for each choice of element)	Order Matters	Order Does Not Matter
Repetition Allowed	**TUPLE** ("List")	**MULTI-SET**
Repetition Not Allowed	**PERMUTATION**	**SUBSET** ("Combination")

Examples:

1. 4-element **tuple** of test scores received by 4 students in a class (order of students must be specified):
(9, 8, 9, 10)
2. 3-element **permutation** to describe first, second, and third-place finishers (in that order) in a sprint race by lane number:
(4,2,5)
3. 3-element **subset** of Pick 3 lottery numbers (order does not matter):
{21, 64, 35}
4. 7-element **multi-set** of individual votes cast by 7 voters for 3 candidates (order does not matter):
<2,1,1,3,1,3,2>.
NOTE: Can also be described by a 3-element tuple representing the number of votes received by each candidate (order of candidates must be specified): (3,2,2)

Definition: A NESTED COLLECTION is a one whose elements are collections themselves.

Example:

1. 3-element list of subsets:
({1, 3, 5}, {2, 4, 6, 8, 10}, {2, 3, 5, 7})
The first subset consists of odd integers, the second subset consists of even integers, and the third subset consists of prime integers.
2. 4-element subset whose elements are 3-element permutations:
{(1, 2, 3), (4, 5, 6), (7, 8, 9), (10, 11, 12)}