# CSCI 320: Homework 5

## Due: Tuesday, 10/23/18

Complete the following exercises. As stated in the syllabus, all assignments are individual work. Please submit one file with all the Prolog definitions. Please note that built-in functions that implement what you are trying to do are off-limits.

1. Write a Prolog program that can be used to obtain the elements common to two lists using the format intersect(List1,List2,IntList). Here List1 and List2 are given lists and IntList is a list containing the elements common to List1 and List2.
2. Write a Prolog program that that can be used to obtain the union of two lists using the format union(List1,List2,UnionList). Here List1 and List2 are given lists and UnionList is a list containing the elements of List1 and List2, but no duplicate elements.
3. Suppose you are given a list of components of some item and the number of those components necessary to build a whole. For example, let's say a loaf of bread requires 4 cups of flour, 1 egg, 1 unit of salt, 2 units of sugar, and 2 units of yeast. (I'm using "unit" for simplicity; we could always add types of units to the list if we wanted.) Our list would look like this:

[[flour, 4], [egg, 1], [salt, 1], [sugar, 2], [yeast, 2]]

Define a predicate, times(N, L1, L2) where N is a positive integer and L1 and L2 are lists such that L2 is L1 with the numbers multiplied by N. Thus, if we want to know how many ingredients we'll need for two loaves of bread, we would query

?- times(2, [[flour, 4], [egg, 1], [salt, 1], [sugar, 2], [yeast, 2]], NewList)

and Prolog would return NewList =

[[flour, 8], [egg, 2], [salt, 2], [sugar, 4], [yeast, 4]]

If times is called with an empty list, it will return an empty list.

1. Write a Prolog program, mergesort(List, MSorted) that will sort a list of integers List according to the mergesort algorithm. MSorted will have this sorted list as its value.