

# Finite Mathematics (Math 10120), Spring 2020

## Quiz 1 Solutions

1. Let  $A$  and  $B$  be subsets of some universal set  $U$ . Assume that  $n(U) = 100,000$ ,  $n(A \cup B) = 90$ ,  $n(A) = 60$ . How many elements are in  $A' \cap B$ ? Show your work, preferably with a Venn diagram. [Warning: not all of the given information is needed to solve the problem.]

*Solution:*

Note that  $A' \cap B$  is the set of elements in  $B$  but not in  $A$ .  $A \cup B$  consists of all elements either in  $A$  or in  $B$ . Of those 90 elements, 60 are in  $A$  so there are  $90 - 60 = 30$  in  $B$  but not in  $A$ .

2. A gang of bank robbers has robbed a bank, but luckily a somewhat near-sighted witness saw the license plate of the get-away car. The witness said that the license plate consisted of **two letters** followed by **three digits**. Each letter was either E, F or P (possibly repeated) and each digit was either 3 or 8 (possibly repeated). So, for example, it might have been FF-383. With this information, how many possible license plates are there for the police to track down?

*Solution:*

Use the multiple principle. The license plate looks like this:

\_\_\_\_\_ - \_\_\_\_\_

Since we are allowed to repeat, the first two blanks each have 3 possibilities, and the last three each have 2 possibilities. So the total number of possibilities is

$$(3)(3)(2)(2)(2) = 72.$$