## [40] Homework 8: Basic Counting

[10] How many ordered pairs of integers (a, b) are needed to guarantee that there are two ordered pairs  $(a_1, b_1)$  and  $(a_2, b_2)$  such that

$$a_1 = a_2 \mod 5,$$
  
$$b_1 = b_2 \mod 5.$$

[10] How many ways are there to seat 20 people around a circular table, where seatings are considered to be the same if they can be obtained from each other by rotating the table? Justify your answer.

[10] How many subsets with more than two elements does a set with 15 elements have?

[10] How many solutions are there to the inequality

$$x_1 + x_2 + x_3 \le 18$$

where  $x_1, x_2$  and  $x_3$  are nonnegative integers? **Hint**: Introduce an auxiliary variable  $x_4$ .