[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

$$\begin{aligned} a_1 &= a_2 \mod 5, \\ b_1 &= b_2 \mod 5. \end{aligned}$$

[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

$$x_1 + x_2 + x_3 \leq 18$$

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