True/False - No explanation needed. (For each: 1 point if correct, 0 points if not answered, -1 points if incorrect)

1. The maximum number of inversions in a list of 7 numbers is $P(7,2) = 42$. True/False

   False. It is $C(7,2) = 21$, one for each pair of elements.

2. We need to add several Stirling numbers of the second kind in order to count the ways to distribute distinguishable balls to indistinguishable boxes because all situations split into cases according to how many boxes are actually non-empty. True/False

   True. Stirling numbers assume that all parts are nonempty, so we need to add together many Sterling numbers.

Problems - Needs justification.

1. A sandwich store sells 7 different types of sandwich. Jamie wants to buy 30 sandwiches for a party. How many possible options does Jamie have if she needs at least 3 of each type? You only need to write a formula. (10 points)

   For 21 of the 30 sandwiches, the type is already set. Jamie must decide what happens with the remaining 9. There are 7 types of sandwich, which can be thought of as urns, and 9 sandwiches, which are balls. Therefore there are $\binom{9+7-1}{9} = \binom{15}{9}$ options.