Use a generating function to determine the following:

1. My cat *Pythagoras* has a collection of 3 balls, 4 bells, and 5 bundles of yarn. In how many ways can he grab 4 of these toys if in each subcategory, they are indistinguishable?

2. A pet store carries 6 iguanas, 5 water dragons, and 3 *Lagrangian* toads. If the iguanas and water dragons must be sold in pairs, then in how many ways can an order for 4 critters be placed, again assuming that in each subcategory, the critters are indistinguishable?

3. Modify question #2 if there is an unlimited supply of *Lagrangian* toads.

4. Determine an explicit formula for the following seuqences for which a recurrence relation is given:

   i) $a_n = 3a_{n-1} + 10a_{n-2}$ where $a_0 = 1$ and $a_1 = 3$

   ii) $a_n = -a_{n-1} + 12a_{n-2}$ where $a_0 = 3$ and $a_1 = 2$

   iii) $a_n = -6a_{n-1} - 5a_{n-2}$ where $a_0 = 1$ and $a_1 = 3$