1. 1. The total number of arrangements is because each of the ten people can be in any position. Two arrangements are equivalent if all people have the same neighbor to the left and to the right. The size of each equivalence class is because, when keeping the same neighbor to the left and to the right, there are different ways to rotate the group. So the number of truly different arrangements is the number of equivalence classes which is.
   2. The total number of arrangements is because of the positions can be filled by any of the women and of the remaining positons can be filled by any of the men (alternating men and women). Two arrangements are equivalent if all people have the same neighbor to the left and to the right. The size of each equivalence class is because, when keeping the same neighbor to the left and to the right, there are different ways to rotate the group. So the number of truly different arrangements is the number of equivalence classes which is.
2. 1. The total number of arrangements is because each of the beads can be in any position. Two arrangements are equivalent if all beads that the same beads next to them. The size of each equivalence class is because, when keeping the same beads next to them, there are different ways to rotate the necklace and each of those ways can be flipped once. So the number of truly different arrangements is the number of equivalence classes which is
   2. The total number of arrangements is because each of the beads can be in any position. Two arrangements are equivalent if all beads that the same beads next to them. The size of each equivalence class is because each arrangement can be flipped once. So the number of truly different arrangements is the number of equivalence classes which is
   3. The total number of arrangements is because the medallion can be in only one position, and the other beads can be in any of the remaining positions. No two arrangements are equivalent because rotating would change which beads are on the left and right of the medallion and flipping the necklace would make the medallion face inward. So the number of truly different arrangements is
3. The total number of anagrams is because any of the letters can be arranged in any of the positions. Two arrangements are equivalent if the different letters are arranged the in the same order, regardless of the order of the same letter. The size of each equivalence class is because there are ways to order the ’s, ways to order the ’s, and ways to order the ’s. So the number of truly different anagrams is the number of equivalence classes which is.
4. The total number of anagrams is because the vowels need to be in alphabetical order, so “A” can be in positions , “E” can be in positions , “I” in , “O” in , “U” in , and “Y” in . The remaining letters can fill in the spaces left in any order. No two arrangements are equivalent since there are no repeated letters. So the number of truly different anagrams is .
5. 1. The total number of arrangements is because there are students in the class. Two arrangements are equivalent if they give each person the same group mates. The size of each equivalence class is because there are ways to order the students in each group, and the groups can be ordered in ways. So the number of truly different arrangements is the number of equivalence classes which is .
   2. The total number of arrangements is because there are students in the class. Two arrangements are equivalent if they give each person the same group mates and the same group is presenting the same section. The size of each equivalence class is because there are ways to order the students in each group. So the number of truly different arrangements is the number of equivalence classes which is .
6. 1. There are ways to choose my nine guests because I have fifteen total friends to choose from.
   2. There are ways to choose my nine guests and three VIP party goers because there are fifteen friends to choose the nine total guests, and I have to choose three VIP party goers from those nine total guests.