Name: \_\_\_\_\_

Group \_\_\_\_\_

For problems 1 - 12, please indicate whether they are BCR, permutation, combination, SB, ordered partition **or none of the above.** The in class exercise is this identification. The calculation of the answers of ALL of the parts is due on Monday 2/22.

1. For a certain airport, there are three runways that are used, A, B and C. Out of the next 15 jets, how many ways can 10 land on runway A, 2 land on runway B and the rest land on runway C?

2. An investor has \$20,000 to invest in at most 4 possible investments. Each investment must be in units of \$1000. If the total \$20,000 is to be invested, how many different investment strategies are possible?

- 3. A math class in high school consists of 5 sophomores, 8 juniors and 17 seniors. If the students want to form a group which consists of 2 sophomores, 2 juniors and 2 seniors, how many different groups can be formed?
- 4. A multiple choice exam has 40 questions each of which have 4 possible choices. How many possible combinations of answers are there?
- 5. How many ways can you arrange 30 insects (indistinguishable) on 10 different plants? Assume that there has to be at least 2 insects on each plant.

- 6. Your high school math class of 31 needs to select 3 members to represent your class in a school competition. How many different sets of students can be selected?
- 7. Using the word 'Indiana, how many different arrangements are possible if the vowels and consonants alternate?

- 8. How many different ways can you arrange the letters in Indianapolis? The possible combinations do not have to represent words.
- 9. Your probability class consists of 30 students. The professors states that either the top 3 or top 4 students will be able to participate in the math Olympiad. How many possible groups of students can participate?
- 10. A college planning committee consists of 3 freshmen, 4 sophomores, 5 juniors and 2 seniors. A subcommittee of 4, consisting of 1 person from each class, is to be chosen. How many different subcommittees are possible?
- 11. You roll 6 dice where the first two are 4-sided, the next two are 6-sided and the last two are 10 sided. What is the total number of combinations if no number can occur twice on any size die?

12. A key pad lock has 10 different digits, and a sequence of 5 different digits must be selected for the lock to open. How many key pad combinations are possible?

The following problems are just due on Monday. These problems combine different types of combinatorics.

13. If you are playing bridge with a standard 52-card deck, what is the probability that a player will get 5 clubs, 4 diamonds, 3 hearts, and 1 spade in a 13-card deal?

- 14. You roll 6 dice where order is important, the first two are 4-sided, the next two are 6-sided and the last two are 10-sided.
- a) How many different combinations are there?
- b) What is the total number of combinations if no number can occur twice on the same size die?
- 15. You fill a mini gumball machine with 60 gumballs: red cherry, pink bubblegum, green lime, and orange orange, 15 of each. Over time you eat all of the gumballs, two at a time. What is the probability of being left with one pink gumball and one green gumball at the end?

- 16. According to an ad in the newspaper for the local café, their Bagel Sandwiches can be "made your way" with "100s of choices for you!." They advertise 7 flavors of bagels, 5 kinds of meant, 3 kinds of cheese, 9 dressings, and 3 veggie selections.
- a) If you select a sandwich made with one of each: bagel, meat, cheese, dressing, and veggie (and you don't care about the order), how many difference combinations of sandwich do you really have to choose from?
- b) Now assume you only eat whole wheat bagels. The same 20 toppings listed above can be used. How many combinations do you have?
- c) If you can choose 3 items to go on your bagel (any of the types), how many different types of sandwiches can you have if the different items are reusable (tomatoes and double ham would be ok)?
- d) If you can choose 3 items but they are not reusable, how many sandwiches are possible (any of the types of bagels can be used)?
- 17. What is the probability that you get a straight in 6 card draw poker? In 6 card draw, each player gets 6 cards and order does not matter. For the straight, you have 5 cards in a row with aces high or low and the last card is NOT in a row.