FRS– Combinatorics and Problem Solving
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Take Home Problem Set 1

This problem set is due in my office (3135 MSB) on or before 12:00 noon on Friday, February 19, 2018. Here are guidelines : Write clear, complete, and organized solutions. Write up solutions as if you are teaching someone how to do the problem. Please do your own work. However, if you are stuck on a problem you may ask me for hints or get hints from classmates. Simplify all computations to get a final exact answer. Please do not copy solutions from each other or have someone else do the work for you. Include the copy of the problems with your solutions. Turn in a hard copy only. I do not accept electronic submissions. Thank you for following these guidelines.

PROBLEMS :

1.) (5 pts.) A well is 320 feet deep. A disoriented banana slug starts at the bottom of the well and each day climbs up 7 feet and down 5 feet. In how many days will the hapless banana slug reach the top of the well ?

2.) (5 pts.) Joe must prepare a dinner consisting of a meat, a vegetable, and a dessert. He can choose meat from pork, beef, lamb, and moose. He can choose a vegetable from corn, peas, string beans, broccoli, and beets. He can choose dessert from ice cream, cookies, and cake. How many different dinner possibilities does Joe have ?

3.) (5 pts.) There are 11 girls and 7 boys on a coed soccer team. The team must select a team captain, a starting goalie, and a back-up goalie, and no player may have more than one of these assignments. If the captain and back-up goalie must be girls and the starting goalie must be a boy, how many different selections are possible ?

4.) (5 pts. each) You have 15 friends who have offered to form three study groups with you and you get to pick the groups. You get to pick 3 others for the math group, 4 others for the writing group, and 5 others for the history group. How many distinct three-group outcomes are possible if
      a.) no one (except you) can be in more than one group ?
      b.) your friends can be in more than one group ?

5.) (5 pts. each) How many ways can a 5-card poker hand result in
      a.) a full house ?
      b.) 2 of a kind ?
      c.) high card hand ?

6.) (5 pts.) How many factors does 19,765,350 have ?

7.) (5 pts. each) How many ways can you select 12 donuts if you select from among
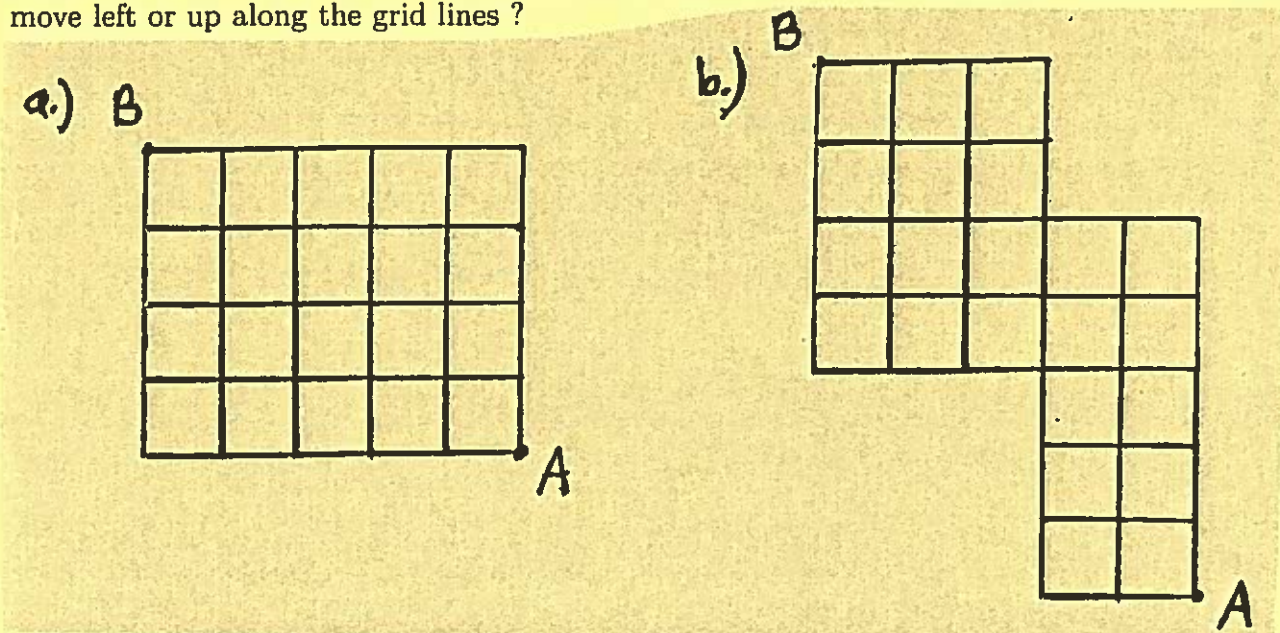   a.) maple and chocolate donuts ?

b.) maple, chocolate, and coconut donuts and you must have at least one of each kind ?

8.) (5 pts. each) How many different permutations are there of all the letters in the word
     a.) lumberjack ?
     b.) hippotherapy ?

9.) (5 pts. each) How many ways can you travel from point A to point B if you can only move left or up along the grid lines ?

10.) (5 pts.) How many ways can you arrange 7 red and 5 yellow ping pong balls in a row?

11.) (5 pts.) How many ways can you arrange 7 Delta Gamma girls and 5 Sigma Chi boys in a row of 12 chairs ?

12.) (5 pts.) How many ways can you arrange 7 Delta Gamma girls and 5 Sigma Chi boys in a row of 15 chairs ?

13.) (5 pts.) Tarzan and Jane are to be seated in a row of 7 people. In how many ways can they be seated so that Tarzan and Jane are not together ?