Homework 1
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2. For each digit position, there are 5 possible digits. Since there are 2n total digit positions, we can determine that there are a total of 5^{2n} possible positive integers.

3. (a) Bob's password rules only allow for $(26 + 26)^3 \times 10^2 \times 10 \times 26^2 \times 10 \times 10 = 9505100800000$ passwords

   (b) The total number of stings of length 10 made from the alphabet of all uppercase & lowercase English letters, decimal digits, and 10 symbols is $(26 + 26 + 10 + 10)^{10} = 3.7439 \times 10^{18}$

6. (a) Any one student from the whole group can take the first position. In the second position there are 9 possible students to choose from, and 8 for the third position. This continues until the final position, so there are simply $10! = 3628800$ possible ways for the students to line up.

   (b) For the 3 positions, it must be a student from group 1, 2, and then 3. The following 3 are the same, however there is now one less student to pick from in each group, so there are only 9 to choose from for those positions. The next 3 are the same way, but only with 8. This continues until the line is complete, so we can determine that there are a total of $10!^3 = 4.7785 \times 10^{19}$

11. (a) For every donut he purcahses, he can select any of the 12. This means that there are a total of $12^6 = 2985984$ possible ways of purchasing donuts.

    (b) Since he wants to choose 6 distinct donuts out of 12 total, we can determine all possible ways to purchase donuts with a permutation. $P(12, 6) = 655280$

    (c) In this case, the order doesn't matter at all. So, using a combination, we can determine that the total number of ways to pick donuts is $\binom{12}{6} = 924$.

12. Assuming there are no positions in korfball, the selection order doesn't matter. So there are a total of $\binom{7}{4} \times \binom{11}{4} = 11550$

13. (a) There are $P(20,4) = 116280$ possible outcomes for the competition

 (b) With the honorable mention certificates, there are a total of $P(20,4) \times C(16,4) = 211629600$ possible outcomes.

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