Math 10B with Professor Stankova
Worksheet, Discussion #2; Tuesday, 1/23/2018
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Cartesian Product

Complementary Counting and PIE

Examples

1. Out of 200 students, there are 100 taking Calculus, 70 taking algebra, and 30 taking both. How many students are taking neither?

2. How many 4 letter sequences do not contain the same letter twice in a row?

Problems

3. True False Complementary counting is not related to Principle of Inclusion/Exclusion.

4. True False Venn diagrams with two circles always look like interlocking rings.

5. How many ways are there to put 7 balls in 3 boxes if each box must have at least one ball?

6. How many numbers from 1 to 300 are even but not divisible by 3?

7. Last semester, out of all the students who took both intro chem and 10A, 75% of students passed the intro chem final and 85% passed the 10A final and 70% passed both. There were 50 students who failed both. How many total students took both intro chem and 10A?

8. How many numbers less than or equal to 1000 are divisible by 7 or 11 but not both?

9. How many license plates with 3 letters followed by 3 digits have either the 3 letters forming a palindrome or the 3 digits forming a palindrome (or both)?

10. How many four digit numbers do not have any repeating 1s?

11. (Challenge) How many ways can we choose non-empty subsets $A, B \subset \{1, 2, 3, 4, 5\}$ such that $A \cap B = \emptyset$.

Pigeonhole Principle

12. I have 7 pairs of socks in my drawer, one of each color of the rainbow. How many socks do I have to draw out in order to guarantee that I have grabbed at least one pair? What if there are likewise colored pairs of gloves in there and I cannot tell the difference between gloves and socks and I want a matching set?