Homework assignment 2

Due September 11, 2015.

Do any 5 problems from the list below. Please write all steps and all details, when writing up your solution or proof. If you refer to a theorem or a result from textbook, cite it!

I expect every student to work independently on homework problems.

If you have questions or need help, please see me.

1. A retail establishment accepts either the American Express or the VISA credit card. A total of 24% of its customers carry an American Express, 61% carry a VISA card, and 11% carry both. What percentage of its customers carry a credit card that the establishment will accept?

2. Let $A$ and $B$ be any subsets of a space $S$. Prove that $(A \cap B) \subset A \subset (A \cup B)$.

3. Let $A$ and $B$ be any subsets of a space $S$. Prove the statement: If $A \cup B = B$, then $A \subset B$.

4. Urn I contains 5 red and 5 blue balls, whereas urn II contains 8 red and 2 blue. A ball is randomly chosen from urn I and put into urn II, and a ball is then randomly selected from urn II. Let $X$ be the number of red balls drawn from urn I and let $Y$ be the number of red balls drawn from urn II. Calculate $P(X \leq Y)$.

5. If six dice are rolled, what is the probability that each of six different numbers will appear exactly once?

6. How many distinct seven-digit phone numbers can you create from the numbers 4, 4, 5, 6, 7, 7, 7?

7. An urn contains 10 balls: 5 white, 3 are red, and 2 are black. Three balls are drawn at random, with replacement, from the urn. What is the probability that all 3 balls are different colors?