

Probability and Statistics 1 - Surgery Hours class (Andres Villegas)

Exercise Sheet 2: Sets and basic probability

1. An insurance agent sells life, health and auto insurance. During the year she met with 85 potential clients. Of these, 42 purchased life insurance, 40 health insurance, 24 auto insurance, 14 both life and health, 9 both life and auto, 11 both health and auto, and 2 purchased all three. How many of these potential clients purchased (a) no policies; (b) only health policies; (c) exactly one type of insurance; (d) life or health but not auto insurance?
2. Prove that
 - a) $B \setminus A = B \cap A^c$
 - b) Distributive law: $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$
3. Let A and B be any sets. Prove
 - a) A is the disjoint union of $A \setminus B$ and $A \cap B$
 - b) $A \cup B$ is the disjoint union of $A \setminus B$ and $A \cap B$, and $B \setminus A$
4. Let X be the n -element set $\{x_1, x_2, \dots, x_n\}$. Show that the number of subsets of X , including X and \emptyset , is 2^n .
5. Assume that boys and girls are equally likely to be born. What is the probability of there being no boys in a family of three children?
6. A point A is selected at random inside an equilateral triangle whose side length is 3. Find the probability p of A from any corner is greater than 1.