

Name:

MATH 320: Homework 1-2

Due _____ : Turn in a hard copy, neat and stapled.

1. If A and B are two sets, draw Venn diagrams to verify the following:
 - (a) $A = (A \cap B) \cup (A \cap \sim B)$.
 - (b) If $B \subset A$, $A = B \cup (A \cap \sim B)$.
2. Refer to #1. Use the identities $A = A \cap S$ and $S = B \cup \sim B$ and a distributive law to prove that:

(Note: “prove” means to try and rewrite the right-hand side of the equation to be equal to the left-hand side)

 - (a) $A = (A \cap B) \cup (A \cap \sim B)$.
 - (b) If $B \subset A$, $A = B \cup (A \cap \sim B)$.
3. A company has 152 employees. There are 94 who have been with the company more than 10 years and 62 of those are college graduates. There are 41 who do not have college degrees and have been with the company less than 10 years. How many employees are college graduates?
4. A school wants to know surveys their students about which sports they play, if any. Responses show that 26 play soccer, 32 play basketball, 23 play volleyball, 14 play soccer and basketball, 11 play soccer and volleyball, 9 play basketball and volleyball, 5 play all three and 40 don't play any sports. How many students are there?
5. An experiment has two stages. First stage consist of drawing a card from a standard deck. If the card is red, the second stage consist of tossing a coin. If the card is black, the second stage consist of rolling a die. How many outcomes are possible?
6. (*Challenge!*) Seven people are to be seated in a row of seven chairs. In how many ways can these people be seated in two of them insist on sitting next to each other?
7.
 - (a) How many different six-digit telephone numbers can be formed if the first digit cannot be nine?
 - (b) How many different six-digit telephone numbers can be formed if the first digit cannot be nine AND you cannot reuse digits?
8. A small town has 50 voters who are registered to vote on a ballot issue on whether a new park should be built. Of these 50 voters, 35 support building the new park. A construction company is going to take a poll of 5 of these 50 voters at random.
 - (a) How many different selections of 5 voters are possible from these 50 voters?
 - (b) How many of the selections in part (a) include 3 or more voters who support building the new park?
9.
 - (a) A company has 12 analysts. It has a major project which has been divided into 3 sub projects, and assigns 4 analyst to each task. In how many ways can this be done?
 - (b) Suppose that in part (a), the company divides the 12 analyst into 3 teams of 4 each, AND each team works on the whole project. In how many ways can this be done?

Select answers

1. (a)
(b)
2. (a)
(b)
3. 79
4. 92
5. 208
6. 1440
7. (a) 900,000
(b) 136,080
8. (a) 2,118,760
(b) 1,797,257
9. (a) 34,650
(b) 5775