CIS 185
Practice 11
Objective:

- Be able to use Basic Counting Principle

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Exercise 1: Six different airlines fly from New York to Denver and seven fly from Denver to San Francisco. How many different pairs of airlines can you choose on which to book a trip from New York to San Francisco via Denver, when you pick an airline for the flight to Denver and an airline for the continuation flight to San Francisco?

6
7

$6 \cdot 7 = 42$ trips

Exercise 2: How many strings of eight English letters are there 26 letters 5 vowels
a) that contain no vowels, if letters can be repeated?

1 letter : 21
2 letter : 21
3 letter : 21
4 letter : 21
5 letter : 21
6 letter : 21
7 letter : 21
8 letter : 21

$21^8 = 37,822,859,361$

b) that start with a vowel, if letters can be repeated?

1 letter : 5
2 letter : 26
3 letter : 26
4 letter : 26
5 letter : 26
6 letter : 26
7 letter : 26
8 letter : 26

$5 \cdot 26^7 = 40,159,050,880$

Exercise 3: How many positive integers between 100 and 999 inclusive 900 integers
a) are not divisible by 4?

$\frac{900}{4} = 225$ integer divisible by 4

$900 - 225 = 675$ integers not divisible by 4

b) are divisible by 3 or 4?

$A \cup B = A + B - A \cap B$

$\frac{900}{3} = 300$

$\frac{900}{4 \cdot 3} = \frac{900}{12} = 75$

$300 + 225 - 75 =$ 450 integers divisible by 3 or 4

Exercise 4: Use the principle of inclusion–exclusion to find the number of positive integers less than 1,000,000 that are not divisible by either 4 or by 6.

$\frac{999,999}{4} = 249,99$

$999,999 - 249,999 = 750,000$

$\frac{999,999}{6} = 166,666$

$999 - 166,666 = 833,333$

$\frac{999,999}{12} = 83,333$

$999,999 - 83,333 = 916,666$

$750,000 + 833,333 - 916,666 = 666,667$

Exercise 5: In how many ways can a photographer at a wedding arrange six people in a row, including the bride and groom, if

a) the bride must be next to the groom?

1 1 4 3 2 1

$1 \cdot 1 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 24$

$5 + 5 = 10$

$24 \cdot 10 = 240$

b) the bride is not next to the groom?

$6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 6! = 720$

$720 - 240 = 480$