Quiz Tues Mar 19 Section 6.1

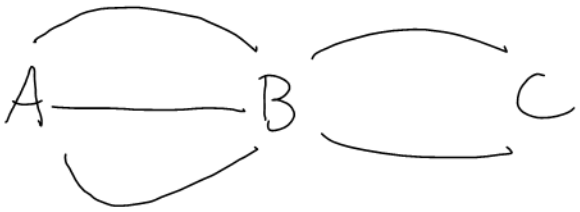
Ch 7 is being omitted

8.1 Counting Techniques

Multiplication Rule

When performing a sequence of tasks, the number of possibilities is multiplied.

Ex:



# of possible routes from A to C?

$$\boxed{3} \times \boxed{2} = 6$$

- 3: # of routes from A to B
- 2: # of routes from B to C

Ex: How many 4-digit positive integers are divisible by 5?

$$\boxed{9} \times \boxed{10} \times \boxed{10} \times \boxed{2} = 1800$$

- 9: # of options for 1st digit (1-9)
- 10: # of options for 2nd digit (0-9)
- 10: 3rd digit
- 2: 4th digit (0 or 5)

Ex: How many 4-digit PINs are possible if repetition of digits is not allowed?

(PIN = personal identification number)

$$\boxed{10} \times \boxed{9} \times \boxed{8} \times \boxed{7} = 5040$$

# of options for 1st digit (0-9)

# of options for 2nd digit

Ex: a) Suppose a license plate looks like ***### where * is a capital letter and # is a digit 0-9. How many possible license plates are there?

$$\boxed{26} \times \boxed{26} \times \boxed{26} \times \boxed{10} \times \boxed{10} \times \boxed{10} = 17{,}576{,}000$$

# of options for 1st symbol

6th symbol

b) What if the pattern can be ***### or ###***?

17,576,000 $10 \times 10 \times 10 \times 26 \times 26 \times 26$

17,576,000 + 17,576,000

= 35,152,000

Complement Rule:

Number of Desirable Outcomes

= (Total Number of Outcomes)

− (Number of Undesirable Outcomes)

Ex: Suppose a license plate looks like ***### where * is a capital letter and # is 0-9.

The letter combination ABC is not allowed. How many possibilities are there?

# of Undesirable Outcomes

= 1 (A) × 1 (B) × 1 (C) × 10 (#) × 10 (#) × 10 (#)

= 1,000

Total # of Outcomes

= 26 (letter) × 26 (letter) × 26 (letter) × 10 (#) × 10 (#) × 10 (#)

= 17,576,000

# of Desirable Outcomes

= 17,576,000 − 1,000

= 17,575,000