

## 22E – Compound Events

Consider a deck of 52 cards that has been shuffled and you are about to choose two cards.



Event A = removing a heart for the first card

Event B = removing a heart for the second card

Case 1: You draw one card, replace it, then shuffle the deck before choosing the second.

$$P(A) = \frac{13}{52} \quad P(B) = \frac{13}{52}$$

$$P(A \text{ and } B) = \frac{13}{52} \cdot \frac{13}{52}$$



**Independent Event** – the selection of the first card does not affect the probability of selecting a heart for the second card.

$$P(A \text{ and } B) = P(A) \times P(B)$$

Case 2: You do not replace the first card before choosing the second.

$$P(\heartsuit) = \frac{13}{52}$$

$$P(\heartsuit) = \frac{12}{51}$$

$$P(\heartsuit \text{ then } \heartsuit) = \frac{13}{52} \times \frac{12}{51}$$

**Dependent Event** – the selection of the first card affects the probability of selecting a heart for the second card.

$$P(A \text{ then } B) = P(A) \times P(B \text{ given that } A \text{ has occurred})$$

Example – Suppose you remove 4 cards (without replacement). What is the probability all four will be aces?

$$P(A) = \frac{4}{52}$$

$$P(B) = \frac{3}{51}$$

$$P(C) = \frac{2}{50}$$

$$P(D) = \frac{1}{49}$$

$$P(A \text{ then } B \text{ then } C \text{ then } D) = \frac{4}{52} \cdot \frac{3}{51} \cdot \frac{2}{50} \cdot \frac{1}{49}$$

HW: read ch 22 E, F, G

Do All Questions ☺