Math 141 Key Topics: 7.4-7.6

Section 7.4

- If S is a *uniform* sample space and E is any event, then

$$P(E) = \frac{n(E)}{n(S)} = \frac{\text{Number of ways for } E \text{ to occur}}{\text{Total number of possible outcomes in } S}$$

- $P(E \cup F) = P(E) + P(F) - P(E \cap F)$
- $P(E^c) = 1 - P(E)$ or $P(E) = 1 - P(E^c)$

Sections 7.5-7.6

- A **conditional probability** is the probability of an event occuring given that another event has already occurred. $P(B|A)$ is the conditional probability of B given that A has already occurred.

$$P(B|A) = \frac{P(A \cap B)}{P(A)}$$

- The **product rule** is just a rearrangement of the above formula:

$$P(A \cap B) = P(A) \cdot P(B|A)$$

- **Tree diagrams** are used to illustrate processes that involve conditional probabilities.
- If two events A and B are **independent**, then the outcome of one does not affect the outcome of the other.

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

- To test for independence, use the following: A and B are independent if

$$P(A \cap B) = P(A) \cdot P(B)$$

- Bayes' Theorem is used to calculate probabilities *after* the outcomes have been observed. It is essentially another version of the general formula for conditional probability given above.