Finite Math

section 7.1 Probability

Terms: experiment (activity), outcome, simple outcome, sample space, event, empirical probability, probability distribution, trial, # of trials.

Ex1, Spin a wheel (with a pointer) of half green, third yellow, and sixth red.
If a wheel is spinned once, what is the probability that the pointer will point to yellow?
experiment is spinning a wheel once.
(simple) outcomes are G, Y, R
sample space = \{G, Y, R\}
probability distribution: \( P(G) = \frac{1}{2}, P(Y) = \frac{1}{3}, P(R) = \frac{1}{6} \). Note \( P(\{G, Y, R\}) = 1 \)
events: \{\}, \{G\}, \{Y\}, \{R\}, \{G, Y\} \{G, R\}, \{Y, R\}, \{G, Y, R\}

Ex2, Toss a coin one time.
(a) List the outcomes
(b) Sample space
(c) Probability distribution.

Ex3, Toss a coin two times. (similar to tossing 2 "different" coins at same time.)
Trial = each coin tossing, #trials = 2
(a) List the outcomes.
(b) Sample space = \{HH, HT, TH, TT\}
(c) \( P(HH), P(HT \text{ in any order}), P(TT) \) (probability distribution)

Ex4, Toss a coin three times. (similar to tossing 3 "different" coins at same time.)
Trial = each coin tossing, # of trials = 3
(a) Sample space
(b) Probability distribution.
Ex5. (Empirical probability)
Out of 12000 students at a school, data shows that 7200 students commute by car, 4200 students commute by bus, and 600 commute by foot. What is the probability that one selected student commutes by bus?
(a) Frequency table (similar to probability distribution) List outcomes, frequencies, relative frequencies.

Def (Probability)
Let sample $S = \{e_1, e_2, e_3, \ldots, e_n\}$ where $e_1, e_2, e_3, \ldots, e_n$ are simple outcomes.
P is a probability (function) if
1. $0 \leq P(e_k) \leq 1$ for every $k$
2. $P(\{e_1, e_2, \ldots, e_n\}) = P(e_1) + P(e_2) + \ldots + P(e_n)$
3. $P(S) = 1$

Ex6. When 2 players play chess, three outcomes are possible: $W, L, D$.
When Matthew and Tiffany plays chess, the probability of Matthew winning is 2 times the probability of Matthew losing, and the probability of drawing is $\frac{1}{2}$ of the probability of Matthew losing. Find the probabilities of each outcome.

Ex7. When 3 persons A, B, and C have a arms wrestling competition, it is known that probability of A winning is equal to the probability of B winning, but the probability of C winning is 3 times the probability of A winning the competition. Find the probability of A winning the competition.