Exercise 1B.1

While visiting the Three Bears' house, Goldilocks finds three bowls of porridge. Upon tasting a bowl she will declare it either Too Hot, Too Cold, or Just Right. How many possible outcomes are there?

Exercise 1B.2

We have 4 imaging modalities available for diagnosing a brain tumor: CT, MRI, MRS, PET.

(a) If all four modalities have to be used, in how many different orders can the physician request them?

(b) Suppose that only three modalities are used and if they all agree, the patient will be considered positive for a brain tumor. How many different combinations of the three chosen modalities can the physician use?

(c) How many different sequences (orderings) of three modalities could the physician order?

Exercise 1B.3

A pair of (standard, six-sided) dice are rolled. Let A be the event that the first die is a 6 and B be the event that the second die is a 6.

(a) Calculate $P(A \cap B)$.

(b) Calculate $P(A \cup B)$.

Exercise 1B.4

A social scientist is recruiting adults who have either diabetes or asthma to participate in a pilot study investigating strategies for managing chronic disease. She will cold-call adults in Columbus, Ohio to recruit study subjects. In Ohio, 6.8% of adults have asthma, 10.5% of adults have diabetes, and 0.8% of adults have both.

(a) What is the probability that a randomly called adult will be eligible for her study?

(b) What is the probability that a randomly called adult will not be eligible for her study?

Exercise 1B.5

Suppose there are two tests for a disease, test G and test H. In the whole population, test G gives a positive result 20% of the time and test H gives a positive result 30% of the time. Test G and test H both give a positive result 10% of the time.

(a) What is the probability of either test G or test H being positive?

(b) What is the probability of test G being negative and test H being positive? (A Venn Diagram may be useful. . .)

Exercise 1B.6

CHALLENGE: In Texas Hold 'Em poker, each player makes the strongest hand he can with 5 cards. Strength of the hand is based on the probability of that specific combination of 5 cards. How likely is four of a kind? ("four of a kind" = 4 cards all the same #, plus 1 other card) Note that there are 52 cards in a standard deck.