1. Your favorite fast food joint has a specialty sandwich and side combo. For the sandwich you can order a hamburger (H) or a chicken sandwich (C), and for the side you can order fries (F), onion rings (R), or a salad (S).

   (a) Describe the **sample space** S of possible combos you could order.

   (b) Consider the event that someone orders fries as a side on their combo. Is this a **simple** or a **compound** event? How do you know?

   (c) The cashier is a little bit bored and decides to try and guess what sandwich and side combo customers will order. Let A be the event that she guesses an order **correctly**. If all order combinations are equally likely, what is the probability of A? Use probability notation.

   (d) Let B be the event that a customer orders **onion rings** as their side. What is the probability of B?

2. Consider a probability experiment in which you toss a coin three times.

   (a) Write out the **sample space** S for the experiment. Let H denote heads and T denote tails.

   (b) Find the probability of $C =$ **two out of three** tosses result in heads. Use probability notation.

   (c) Find the probability of $D =$ the experiment results in **at least one** tails. Use probability notation.

   (d) Describe the **complement** of event D, denoted D^C, in terms of the experiment.

   (e) Find the probability of D^C using **the complement rule** and your result in Part (c).

   (f) Describe two **mutually exclusive** events in your sample space.

3. Consider the following table of data collected from a sample of 36 students in STAT 3090 last fall. Students were asked whether they were a morning person or a night person, as well as what their hot beverage of choice is. Students could only choose one response for each variable.

	Coffee (C)	Tea (T)	Hot Cocoa (H)	TOTAL
Morning Person (M)	3	3	2	8
Night Person (N)	17	3	8	28
TOTAL	20	6	10	36

For each of the following, use proper probability **notation**, write the associated **fraction**, and express your final answer as a **decimal** number rounded to four places. If you apply a probability rule (such as the Addition Rule or Complement Rule), **show the formula** in your work.

Find the probability that a randomly selected student from the class...

(a) Prefers tea

(b) Is a morning person **and** prefers coffee

(c) Is a night person **and** prefers hot cocoa

(d) Prefers tea **or** hot cocoa

(e) Prefers coffee **or** is a morning person

(f) Does **not** prefer coffee or tea

4. Choose one of the probabilities that you calculated for Question 1 Parts (a)–(f). Write a sentence stating what the probability of a certain event is by stating the **sample** of interest, the **event** described, and the probability **value**.

5. Identify two mutually exclusive events in this situation. What is the probability of their **intersection**, i.e., the probability that they both occur at the same time? Express your answer using probability notation.

6. There were two variables used to record responses from students in the sample: whether a student is a morning or night person, and what their hot beverage of choice is.

   (a) What **type** of variables are these?

   (b) What **level of measurement** do both of these variables have?

7. A survey of high school students indicated that 33% are in a relationship, 25% are involved in sports, and 11% are involved in both. Use the information to answer the following questions.

   (a) What is the probability that a student is involved in a relationship **given** that they're involved in sports?

   (b) Is being in a relationship **independent** of being involved in sports? Justify your answer using probability (regardless of your own personal theories!).

8. A company has two suppliers for electrical components. China ships 73% of the electrical components used by the supplier. The probability that the component will be defective **given** that it was shipped from China is 0.06. What is the probability that a randomly selected component received by the supplier will ship from China **and** be defective?

9. You have a standard deck of 52 cards. Recall that a deck of cards has four suites (hearts, diamonds, spades, clubs), each with thirteen values (2-10, J, Q, K, A). Find the probability that you draw two aces **in a row** without replacing the first ace.

10. General Leia Organa can plan a campaign to fight one major intergalactic battle or three small galactic battles. She believes she has a probability of 0.77 of winning the large battle (L) and a probability of 0.89 of winning each of the small battles (S). Victories or defeats in the small battles are independent. Leia must win either the large battle or all three small battles to win the campaign. Which strategy should she choose?

    (a) First find the probability of winning the large battle.

    (b) Find the probability of winning all three small battles.

    (c) Which strategy should she choose if she wants to win the campaign? Justify your answer.