1. Let $U = \{a, b, c, d, e, f, g\}$, $A = \{a, b, c, d\}$, $B = \{a, b, e, f\}$ and $C = \{c, e, g\}$. Find the following.
   a. $A \cup \overline{B \cap C}$
   b. $\overline{A} \cup (\overline{B} \cap \overline{C})$

2. A survey of math conference attendees shows that 43 indicated that they like Battlestar Galactica, while 35 enjoyed Star Trek. However, eighteen attendees liked both programs. How many different people are represented by this poll?

3. Construct a truth table for the statement $\sim (p \lor q) \leftrightarrow (\sim p \land \sim q)$. Is the statement a tautology?
4. Determine if the argument is valid or invalid. State the type of reasoning or fallacy.

   If Alice drinks from the bottle marked “poison,” she will become sick.
   Alice does not drink from a bottle that is marked “poison.”
   Therefore, she does not become sick.

5. Express the Babylonian numeral ▽▽▽▽▽▽ as a Hindu-Arabic numeral.

6. Express 3052 as an Egyptian numeral.

7. Write 10011011\text{two} as a decimal number.
8. Write 2073 in base five.

9. Calculate the monthly finance charge for a credit card charging 19% interest, if you have a $600 balance and make a $150 payment on the 13th day of a 31 day month using
   a. the adjusted balance method.

   b. the average daily balance method.

10. The local credit union is offering a 30-year fixed-rate mortgage with an interest rate of 5.5%. If you can afford a $500 monthly payment, how much can you borrow towards a house purchase?

11. Amy’s Ice Cream makes sundaes that consist of your choice of 3 scoops of any of their 20 flavors of ice cream; a choice of chocolate, strawberry or butterscotch syrup; and your choice of two different toppings from their 10 offerings. How many different sundaes are possible?
12. Suppose you have 9 watermelon and 16 green apple Jolly Rancher candies in a bag. If you select two pieces of candy without replacement, find the following probabilities.

   a. \( P(\text{one watermelon and one green apple}) \)

   b. \( P(\text{watermelon on the second draw | watermelon on the first draw}) \)

   c. \( P(\text{2 green apple}) \)

13. Use Euler circles to check the validity of the argument.

   All grass dies.
   All men die.
   Therefore, all men are grass.

14. Sketch a Venn diagram of the set \( A \cup (B \cap \overline{C}) \).

15. The Powerball lottery pays off its $1 million prize in 20 annual installments of $50,000. What is the value of this annuity if the current annual rate is 5%?

16. In the (much simplified version) of the game craps, player rolls a pair of standard dice. If the shooter rolls a 7 or an 11, he wins $5. If he rolls a 2, 3 or 12, he loses $5. How much should you pay to play?