Mid-term Test for College Discrete Mathematics — SAMPLE

- 1. Draw a Venn diagram for the following set: $(A \setminus B) \cup (B \setminus C) \cup (C \setminus A)$.
- 2. Expand the following sum and product:

$$\sum_{2 \le i \le 5} \frac{1}{2^i} \qquad \qquad \prod_{i=-2}^2 3^i$$

- 3. Write the decimal numbers 35_{10} and 23_{10} into base 2, and calculate their sum in binary form, and then write the sum into decimal form back.
- 4. There are 10 people at a running competition. In the end, only the first 6 arrivals are recorded into the final list. How many possible lists exist?
- 5. How many integer solutions does the following equation have?

x + y + z = 11, where $x \ge 2, y \ge 2, z \ge 2$

- Decide if the following number in base 7 is even number or odd: 34257. Why?
- 7. Suppose that |A| = 12, |B| = 18. How many common elements do A and B have if $|A \cup B| = 25$.

Suppose furthermore that |C| = 8, $|A \cap B \cap C| = 2$, $|A \cup B \cup C| = 30$. Show that either $(A \cap C) \setminus B$ or $(B \cap C) \setminus A$ are empty.