These exercises are from our text (A Discrete Transition To Advanced Mathematics, by Bettina Richmond, Thomas Richmond). For each submitted homework, a random subset of the assigned problems will be graded.

**HOMEWORK ONE:** Read sections 1.1-1.5 and attempt the following exercises

1.1: 3, 5, 9.
1.2: 4, 8, 12.
1.3: 4, 5, 8.
1.4: 2, 6, 12, 13.
1.5: 3, 6.

**HOMEWORK TWO:** Read sections 1.6 and 2.1 and attempt the following exercises

1.6: 4, 6, 7, 9, 10.
2.1: 4, 7, 9, 11, 13, 15, 16, 20, 24. Hint for 20: For \( n \in \mathbb{N} \), consider \((n+1)! + 2, (n+1)! + 3, \ldots, (n+1)! + (n+1)\).

**HOMEWORK THREE:** Read sections 2.2 and 2.3 and attempt the following exercises

2.2: 2, 4, 5, 7, 8, 11, 12, 13, 14, and this exercise: Prove that \( \forall n \in \mathbb{N}, 4^{n+1} + 5^{2n-1} \) is a multiple of 21.
2.3: 5, 6, 8, 11.

**HOMEWORK FOUR:** Read sections 4.1-4.4 and attempt the following exercises

4.1: 4, 7.
4.2: 3, 7.
4.3: 5, 8, 10, 11.
4.4: 4, 6, 8, 9, 12, 13, 15.

**HOMEWORK FIVE:** Read sections 5.1-5.3 and attempt the following exercises

5.1: 3, 5, 9, 15, 16.
5.2: 3, 6, 7, 8, 9.
5.3: 2, 3, 6, 8, 11.

**HOMEWORK SIX:** Read sections 6.1-6.3 and attempt the following exercises

6.1: 7, 10, 13, 16.
6.2: 1, 4, 5, 6, 7, 12.
6.3: 4, 8. Hint for 8: Consider a function that takes in an arbitrary subset \( S \subseteq A \) and produces a function \( f_S : A \to \{0, 1\} \) given by

\[
\begin{align*}
0 & \quad \text{if } x \not\in S \\
1 & \quad \text{if } x \in S
\end{align*}
\]
Suggested problems for exam preparation:

1.1: 2, 4.
1.2: 3, 5, 7, 9, 15.
1.3: 1, 6, 9.
1.4: 3, 8.
1.5: 1, 2, 4, 5.
1.6: 3, 5, 8, 11.
2.1: 6, 8, 13, 18, 19, 25, 28.
2.2: 3, 6, 9, 10.
2.3: 1, 2, 9.
4.1: 1, 2, 8.
4.2: 1, 6, 8.
4.3: 3, 4, 7.
4.4: 3, 10, 14.
5.1: 5, 6, 7, 11, 17.
5.2: 2, 4, 5.
5.3: 4, 5, 7.
6.1: 1, 2, 4, 11, 12, 19.
6.2: 2, 3, 8.
6.3: 2, 6.