Q1. Exercise 2.3-4 in CLRS (Recursive Insertion Sort). Once you have found the recurrence equation, solve it using a recursion tree.

Q2. Problem 2-2 in CLRS (Correctness of Bubblesort), all parts. When analyzing runtime, count only comparison operations (uses of the “<” operator).

Q3. Problem 2-4 in CLRS (Inversions), all parts.

Q4. Exercise 3.2-6 in CLRS (Fibonacci by induction). Be sure to read the page preceding the exercises for relevant background material.

Q5. Problem 3-2 in CLRS (Relative Asymptotic Growths). Fill in all the entries of the table, but you need only prove your answers for four entries (you may choose any four you like). You need not show any of your work except for the four table entries you prove. You will get half credit for a correct table with no proofs at all.

Q6. Problem 3-4 in CLRS (Asymptotic notation properties), all parts.

Q7. Problem 3-5 in CLRS (Variations on O and Ω), all parts.

Q8. Exercise A.2-1 in Appendix A of CLRS. You are asked to show that \( \sum_{k=1}^{n} 1/k^2 \) is bounded above by a constant. Hint: Read Appendix A carefully (you may skip “Approximation by integrals”), particularly the techniques for bounding the harmonic series, \( H_n \).