Question 1. (8 points) $O(n^3 \log n)$, $O(n^2)$

Question 2. (6 points) 26, 36, 17, 115, 40, 87

Question 3. (8 points) T, F, F, F

Question 4. (18 points)

1. (5 points)

   `a: 1, b: 9, c: 2, d: 7, e: 4, f: 5, g: 3, h: 8, i: 6, j: 10.`

2. (4 points) (b, h), (d, i)
3. (4 points) g, h, d, i
4. (5 points)

   `a: 1, b: 10, c: 2, d: 5, e: 6, f: 7, g: 4, h: 8, i: 3, j: 9.`

Question 5. (8 points)

- Select the $(\log n)$th smallest item (call it x) using the linear-time selection algorithm we presented in class. Then go through S collecting the $\log n$ items that are $\leq x$. This step takes linear time.
- Sort the $\log n$ items collected in Step 1: The kth item in this small sorted list is the kth smallest item in S. This step takes $O(\log n \log \log n)$ time, so the total time is linear.

Question 6. (6 points) Choice 2

Question 7. (6 points)

- (3 points) $T(n) = c_1$ if $n \leq 30$, otherwise $T(n) = T(2n/3) + c_2$.
- (3 points) Solution is $O(\log n)$.

Question 8. (5 points). Choice 1

Question 9. (12 points) F, F, T, F

Question 10. (6 points) T, T

Question 11. (10 points)

1. (6 points) 2^k
2. (4 points) $\log n$

Question 12. (7 points) $pre[u] < pre[w]$ and $post[u] > post[w]$