Question 1:
- Some students did not justify their answers.
- Some students used worst case/Big-O, or best case/Big Omega, or average case/Theta interchangeably. In particular, Theta does not describe the average case only.
- Some students did not include a term with \( n \) for the description in part (e).

Question 2:
- Some students thought that the total number of repetitions of the operations in the nested loops is \( n \log n \), not \( n^2 \). See slide 30 of Module 2 for a similar example.
- Some students thought that duplicate values were copied from the Multiset, rather than unique values.

Question 3:
- Generally well done.
- Some students forgot to check that parent, grandparent, and uncle/aunt nodes existed.

Question 4:
- Some students updated the tail of the list unnecessarily multiple times.
- Some students did not actually create a new doublenode that would be a node in the doubly-linked list, but rather tried to adapt the singlenode.
- Some students forgot to assign the tail at the end of the doubly-linked list.

Question 5a:
- Some students had an off-by-one error.
- Some students did not address the special case when \( r = 0 \) for 5a. You must update the head of the linked list in this case.
- Some students confused the rank of the node with its contents.

Question 5b:
- Some students had an off-by-one error.
- Some students used Python list functions, which are not allowed (as described on the instructions on page 2 of the midterm.)
- Some students forgot to update the size of the Ranking.

Question 6:
- Some students' explanations were unclear.
- Some students forgot that when adding to the sorted array, that it would be necessary to maintain the sorted order. This would mean shifting elements past the insertion point.
- Some students thought that you must do a binary search before deleting. However, since you would be required to shift elements after the deletion, which is a linear cost in the worst case, then there is no advantage in doing a separate search.