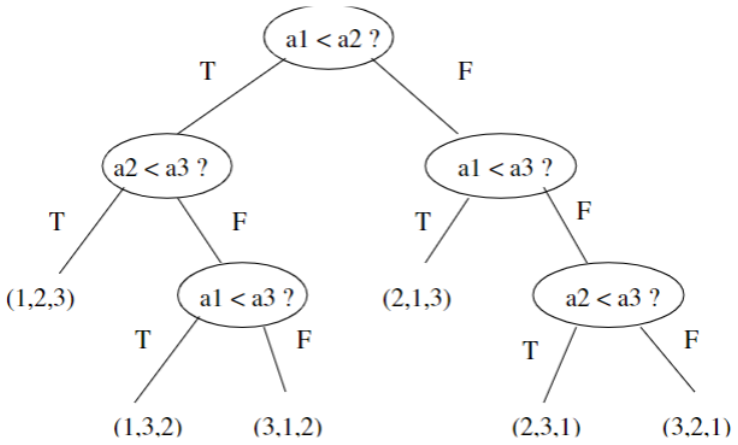
Decision Tree Worksheet

Complete the decision tree for insertion sort on three elements shown on the board and then answer the questions at the bottom.



1. What is the worst-case number of comparisons needed to sort three elements?

   3

   (most path a program can take)

2. What is the best-case number of comparisons needed to sort three elements?

   2

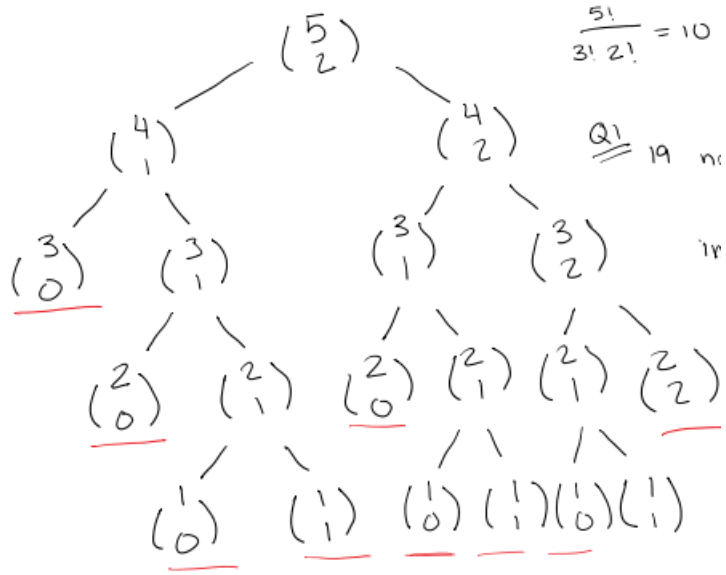
   (least path the program can take)

3. What is the average number of comparisons needed to sort three elements assuming that each of the six permutations is equally likely

$$\frac{(2 \times 2 + 4 \times 3)}{6} = 2\frac{2}{3}$$

Binomial Coefficient Worksheet

Draw the recursion tree for computing $\binom{5}{2}$ based on the Pascal recurrence and answer the questions below.



1. Use the tree to determine how many calls would a recursive algorithm make to compute $\binom{5}{2}$.

   19 nodes

2. Can you deduce from this a closed formula to determine the number of calls to compute $\binom{n}{k}$.

$$2\binom{n}{k} - 1$$