Chapter 4.1-4.3 problems:

1. Draw a partial search tree that traces the PartialDigest algorithm like we did in class. Trace the algorithm long enough to generate the first solution. Use the partial digest from the problem 4.2, i.e., \(L = \{1, 1, 2, 2, 3, 3, 4, 4, 5, 5, 6, 6, 6, 9, 9, 10, 11, 12, 15\}\).

2. Problem 4.11: The search trees in the text are complete k-ary trees: each vertex that is not a leaf has exactly \(k\) children. It is also balanced: the number of edges in the path from the root to any leaf is the same (this is sometimes referred to as the height of the tree). Find a closed-form expression for the total number of vertices in a complete and balanced k-ary tree of height \(L\).

3. Write a program (any language) to implement the Partial Digest algorithm (on page 90). Run the program on the \(L = \{1, 1, 2, 2, 3, 3, 4, 4, 5, 5, 6, 6, 6, 9, 9, 10, 11, 12, 15\}\), and turn in the output showing all the X’s with a printout of the program.