Worksheet: Huffman Encoding

1. Given the phrase: "she sees the three trees", build the Huffman Tree by following the steps below.

   a) Create a tally chart of frequencies for each letter.

Symbol	`s`	`h`	`e`	`space`	`t`	`r`
Tally						
Total						

   b) Order the symbols by frequency of occurrence with lower frequency on the left. This is the frequency-weighted priority queue for the data symbols. For symbols of equal frequency, keep the order the same as in the tally chart, above.

Symbol						
Total						

   c) Draw the first binary tree. This tree will have three nodes – a root with two leaves. Start by creating a new node and setting the first two elements from the priority queue as the left (first element) and right (second element) children. Let the symbol for the root node be *`N1`*.

   d) Complete the priority queue resulting from placing node *`N1`* back onto the priority queue. Add the new node <u>later</u> than any existing node with the same weight that is already in the queue.

Symbol					
Total					

   e) Repeat the same process with the next two elements on the queue, creating new node *`N2`*.

Symbol				
Total				

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f) Repeat again. This time one of the nodes will be a tree. The procedure is not different, however when you draw the tree, it will have three levels and consist of five nodes, three of which are leaf nodes.

Symbol			
Total			

g) Only three nodes in the priority queue. Complete the last two steps and draw the final tree below. Complete the two priority queue steps.

Symbol		
Total		

Symbol	
Total	

h) Write the encoding on the branches of the tree above, then complete the binary code table below.

Symbol	`s`	`h`	`e`	`space`	`t`	`r`
Tally						

i) Decode the message: “01011101100000111101011”