Discrete Mathematics and Programming

Assignment 3

1. The **ternary search algorithm** locates an element in a list of increasing integers by successively splitting the list into three sublists of equal (or close to equal as possible) size and restricting the search to appropriate piece in contrast to binary search which splits the list into two sublist. The pseudocode is given below. Implement following pseudocode using any programming language of your choice. Also attach the screenshot of your output with your code.

$$
\begin{aligned}
&\textbf{procedure } \textit{ternary search}(x : \text{integer}, a_1, a_2, \ldots, a_n : \text{increasing integers}) \\
&i := 1 \\
&j := n \\
&\textbf{while } i < j - 1 \\
&\qquad l := \lfloor (i+j)/3 \rfloor \\
&\qquad u := \lfloor 2(i+j)/3 \rfloor \\
&\qquad \textbf{if } x > a_u \textbf{ then } i := u + 1 \\
&\qquad \textbf{else if } x > a_l \textbf{ then} \\
&\qquad\qquad i := l + 1 \\
&\qquad\qquad j := u \\
&\qquad \textbf{else } j := l \\
&\textbf{if } x = a_i \textbf{ then } \textit{location} := i \\
&\textbf{else if } x = a_j \textbf{ then } \textit{location} := j \\
&\textbf{else } \textit{location} := 0 \\
&\textbf{return } \textit{location} \\
&\{ \textit{location} \text{ is the subscript of the term equal to } x \ (0 \text{ if not found}) \}
\end{aligned}
$$

2. Write a program to implement greedy algorithm to find minimum number of coins to make a change for N. Also attach the screenshot of your output with your code.

3. Calculate the time complexity of your both codes using big-O notation.