

Lab Exercises

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1 Sample

```

Data: Some input data
Result: Same for output data
/* this is a comment */
1 initialization;
2 if this is true then
3   we do that, else nothing;
4   if we agree that then
5     we do that;
6   else
7     else we will do a more complicated if using else if;
8     if this first condition is true then
9       we do that;
10    else if this second condition is true then
11      this is done
12    else if this other condition is true then
13      this is done
14    end
15    else
16      in other case, we do this
17    end
18  end
19 end
```

Algorithm 1: Algorithm to Demonstrate Different Ifs

2 Question 4a

Data: A set $C = \{c_1, c_2 \dots c_r\}$ of denominations of coins where $c_1 > c_2 > \dots > c_r$ and a positive number n .

Result: A list of coins $d_1, d_2 \dots d_k$ such that $\sum_{i=1}^k d_i = n$ and k is minimized.

```
1  $C \leftarrow \emptyset$ ;  
2 for  $i \leftarrow 1$  to  $r$  do  
3   while  $n \geq c_i$  do  
4      $C \leftarrow C \cup \{c_i\}$ ;  
5      $n \leftarrow n - c_i$ ;  
6   end  
7 return  $C$ ;
```

Algorithm 2: makes change using smallest no. of coins

3 Question 4b

Data: A sequence of integers (a_1, a_2, \dots, a_n)

Result: The index of the first location with the same value as in a previous location in the sequence

```
1 location  $\leftarrow$  0;
2 i  $\leftarrow$  2;
3 while i  $\leq$  n and location = 0 do
    /* Do the following if i is less than or equal to n */
4     j  $\leftarrow$  1;
5     while j < i and location = 0 do
6         if  $a_i = a_j$  then
7             | location  $\leftarrow$  i;
8         end
9         else
10            | j  $\leftarrow$  j + 1;
11        end
12    end
13    i  $\leftarrow$  i + 1;
14 end
15 return location;
```

Algorithm 3: FIND DUPLICATE