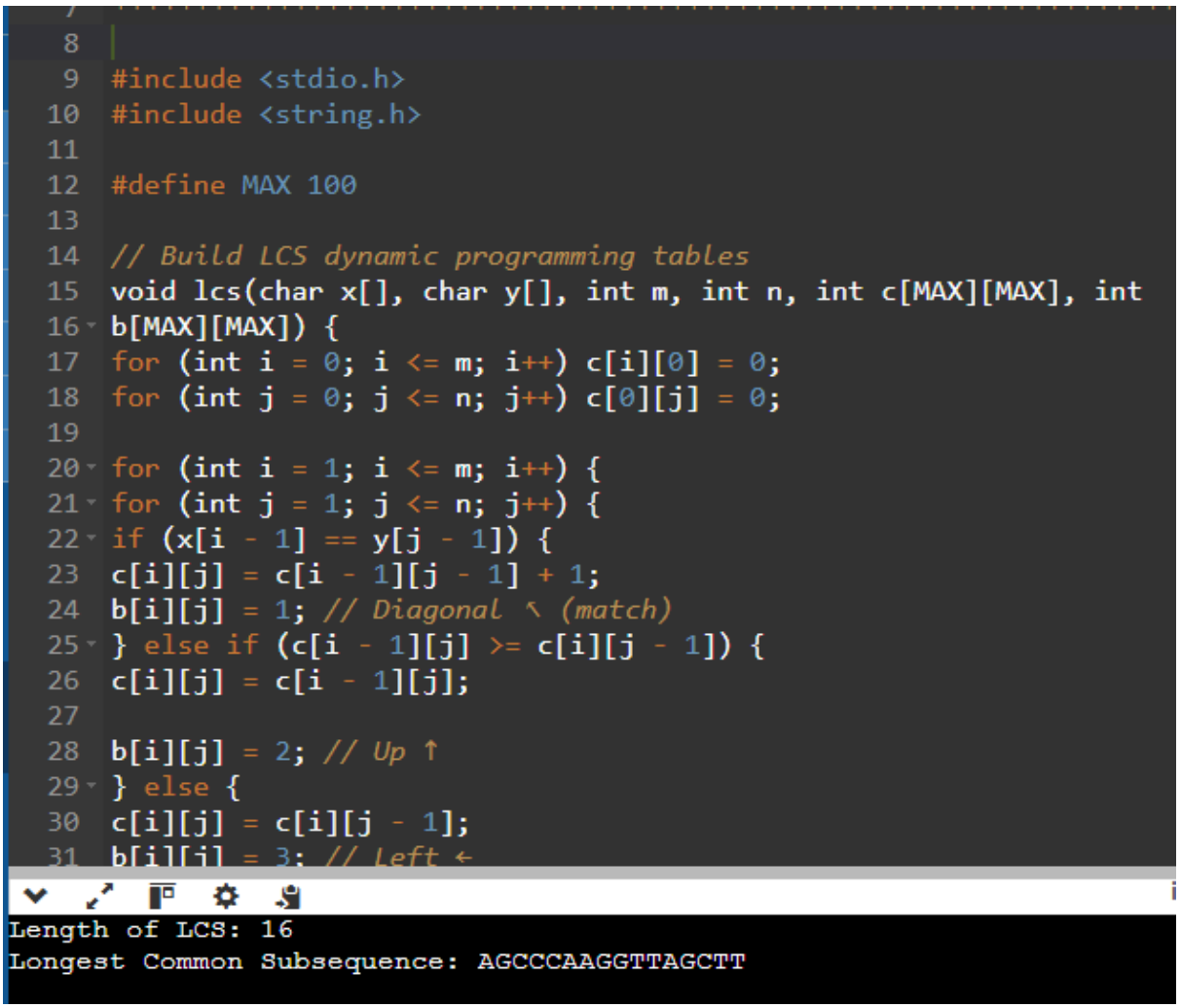
Pract 5
A8_b2_20

TASK:1

```
#include <stdio.h>

#include <string.h>


#define MAX 100


// Build LCS dynamic programming tables

void lcs(char x[], char y[], int m, int n, int c[MAX][MAX], int

b[MAX][MAX]) {

for (int i = 0; i <= m; i++) c[i][0] = 0;

for (int j = 0; j <= n; j++) c[0][j] = 0;


for (int i = 1; i <= m; i++) {

for (int j = 1; j <= n; j++) {

if (x[i - 1] == y[j - 1]) {

c[i][j] = c[i - 1][j - 1] + 1;

b[i][j] = 1; // Diagonal ↖ (match)

} else if (c[i - 1][j] >= c[i][j - 1]) {

c[i][j] = c[i - 1][j];


b[i][j] = 2; // Up ↑

} else {
```

```
c[i][j] = c[i][j - 1];
b[i][j] = 3; // Left ←
}
}
}

// Print only final LCS length
printf("Length of LCS: %d\n", c[m][n]);
}

// Print the LCS using the direction matrix
void printlcs(int b[MAX][MAX], char x[], int i, int j) {
if (i == 0 || j == 0) return;

if (b[i][j] == 1) {
printlcs(b, x, i - 1, j - 1);
printf("%c", x[i - 1]);
} else if (b[i][j] == 2) {
printlcs(b, x, i - 1, j);
} else {

printlcs(b, x, i, j - 1);
}
}

int main() {
char x[] = "AGCCCTAAGGGCTACCTAGCTT";
char y[] = "GACAGCCTACAAGCGTTAGCTTG";
```

```
int m = strlen(x);
int n = strlen(y);

int c[MAX][MAX], b[MAX][MAX];

// Compute LCS
lcs(x, y, m, n, c, b);

// Print LCS
printf("Longest Common Subsequence: ");
printlcs(b, x, m, n);
printf("\n");

return 0;

}
```



```
#include <stdio.h>
#include <string.h>

#define MAX 100

// Build LCS dynamic programming tables
void lcs(char x[], char y[], int m, int n, int c[MAX][MAX], int
b[MAX][MAX]) {
for (int i = 0; i <= m; i++) c[i][0] = 0;
for (int j = 0; j <= n; j++) c[0][j] = 0;

for (int i = 1; i <= m; i++) {
for (int j = 1; j <= n; j++) {
if (x[i - 1] == y[j - 1]) {
c[i][j] = c[i - 1][j - 1] + 1;
b[i][j] = 1; // Diagonal ↖ (match)
} else if (c[i - 1][j] >= c[i][j - 1]) {
c[i][j] = c[i - 1][j];

b[i][j] = 2; // Up ↑
} else {
c[i][j] = c[i][j - 1];
b[i][j] = 3; // Left ←
```

```
Length of LCS: 16
Longest Common Subsequence: AGCCCAAGGTTAGCTT
```

Task2

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
void lrs(char *str) {
int n = strlen(str);
// Allocate memory for dp table dynamically
int **dp = (int **)malloc((n+1) * sizeof(int *));
for (int i = 0; i <= n; i++) {
dp[i] = (int *)malloc((n+1) * sizeof(int));
for (int j = 0; j <= n; j++) {
dp[i][j] = 0;
}
}
// Fill dp table for Longest Repeating Subsequence
for (int i = 1; i <= n; i++) {
for (int j = 1; j <= n; j++) {
if (str[i-1] == str[j-1] && i != j)
```

```
dp[i][j] = 1 + dp[i-1][j-1];
else
dp[i][j] = (dp[i-1][j] > dp[i][j-1]) ? dp[i-1][j] : dp[i][j-1];
}
}
printf("The length of the longest repeating subsequence is: %d\n", dp[n][n]);
// Reconstruct the longest repeating subsequence

int i = n, j = n;
char res[n+1];
int index = 0;
while (i > 0 && j > 0) {
if (str[i-1] == str[j-1] && i != j) {
res[index++] = str[i-1];
i--;
j--;
} else if (dp[i-1][j] > dp[i][j-1]) {
i--;
} else {
j--;
}
}
res[index] = '\0';
// Reverse the result since we built it backwards
for (int k = 0; k < index / 2; k++) {
char temp = res[k];
res[k] = res[index - k - 1];
res[index - k - 1] = temp;
}
printf("The longest repeating subsequence is: %s\n", res);
// Free dynamically allocated memory
for (int i = 0; i <= n; i++) {
free(dp[i]);
}
free(dp);
}
int main() {
char str[] = "aabb";
lrs(str);
return 0;
}
```

```
7  ********************************************************************
8
9  #include <stdio.h>
10 #include <stdlib.h>
11 #include <string.h>
12 void lrs(char *str) {
13 int n = strlen(str);
14 // Allocate memory for dp table dynamically
15 int **dp = (int **)malloc((n+1) * sizeof(int *));
16 for (int i = 0; i <= n; i++) {
17 dp[i] = (int *)malloc((n+1) * sizeof(int));
18 for (int j = 0; j <= n; j++) {
19 dp[i][j] = 0;
20 }
21 }
22 // Fill dp table for Longest Repeating Subsequence
23 for (int i = 1; i <= n; i++) {
24 for (int j = 1; j <= n; j++) {
25 if (str[i-1] == str[j-1] && i != j)
26 dp[i][j] = 1 + dp[i-1][j-1];
27 else
28 dp[i][j] = (dp[i-1][j] > dp[i][j-1]) ? dp[i-1][j] : dp[i][j-1];
29 }
```

```
The length of the longest repeating subsequence is: 2
The longest repeating subsequence is: ab
```