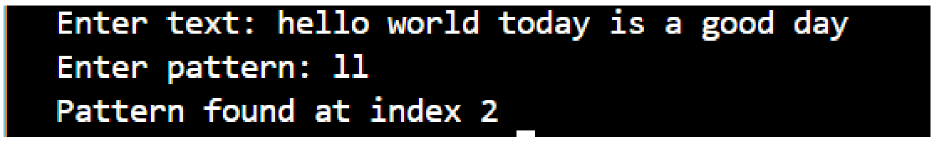
ADA LAB extra programs

1. Pattern matching

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

void naivePatternSearch(char *text, char *pattern) {
   int n = strlen(text);
   int m = strlen(pattern);

   for (int i = 0; i <= n - m; i++) {
      int j;

      for (j = 0; j < m; j++) {
         if (text[i + j] != pattern[j])
            break;
      }

      if (j == m) {
         printf("Pattern found at index %d\n", i);
      }
   }
}

int main() {
   char text[100], pattern[100];

   printf("Enter text: ");
   gets(text);
   printf("Enter pattern: ");
   gets(pattern);
   naivePatternSearch(text, pattern);

   return 0;
}
```

OUTPUT:



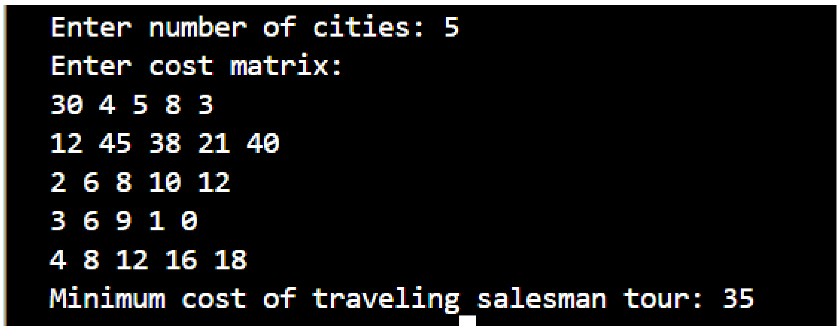
```
Enter text: hello world today is a good day
Enter pattern: ll
Pattern found at index 2
```

2. Travelling salesman

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

int n, cost[10][10];
int minCost = INT_MAX;

int calculateCost(int tour[]) {
   int totalCost = 0;
   for (int i = 0; i < n - 1; i++) {
      totalCost += cost[tour[i]][tour[i + 1]];
   }
   totalCost += cost[tour[n - 1]][tour[0]];
   return totalCost;
}
void tsp(int tour[], int visited[], int count) {
   if (count == n) {
      int currentCost = calculateCost(tour);
      if (currentCost < minCost) {
         minCost = currentCost;
      }
      return;
   }

   for (int i = 0; i < n; i++) {
      if (!visited[i]) {
         visited[i] = 1;
         tour[count] = i;
         tsp(tour, visited, count + 1);
         visited[i] = 0;
      }
   }
}

int main() {
   printf("Enter number of cities: ");
   scanf("%d", &n);

   printf("Enter cost matrix:\n");
```

```
    for (int i = 0; i < n; i++) {
        for (int j = 0; j < n; j++) {
            scanf("%d", &cost[i][j]);
        }
    }

    int tour[10] = {0};
    int visited[10] = {0};
    visited[0] = 1;
    tour[0] = 0;
    tsp(tour, visited, 1);

    printf("Minimum cost of traveling salesman tour: %d\n", minCost);
    return 0;
}
```

OUTPUT:

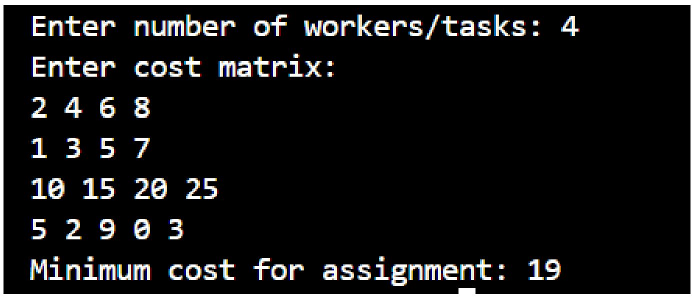


```
Enter number of cities: 5
Enter cost matrix:
30 4 5 8 3
12 45 38 21 40
2 6 8 10 12
3 6 9 1 0
4 8 12 16 18
Minimum cost of traveling salesman tour: 35
```

3. Assignment Problems

```
#include <stdio.h>

#include <limits.h>

int n, cost[10][10];

int minCost = INT_MAX;


void assignment(int worker, int currentCost, int visited[10]) {

    if (worker == n) {

        if (currentCost < minCost) {

            minCost = currentCost;

        }

        return;

    }


    for (int task = 0; task < n; task++) {

        if (!visited[task]) {

            visited[task] = 1;

            assignment(worker + 1, currentCost + cost[worker][task], visited);

            visited[task] = 0;

        }

    }

}


int main() {

    printf("Enter number of workers/tasks: ");

    scanf("%d", &n);

    printf("Enter cost matrix:\n");

    for (int i = 0; i < n; i++) {
        for (int j = 0; j < n; j++) {
            scanf("%d", &cost[i][j]);
        }
    }

    int visited[10] = {0};
    assignment(0, 0, visited);
    printf("Minimum cost for assignment: %d\n", minCost);
    return 0;
}
```

OUTPUT:



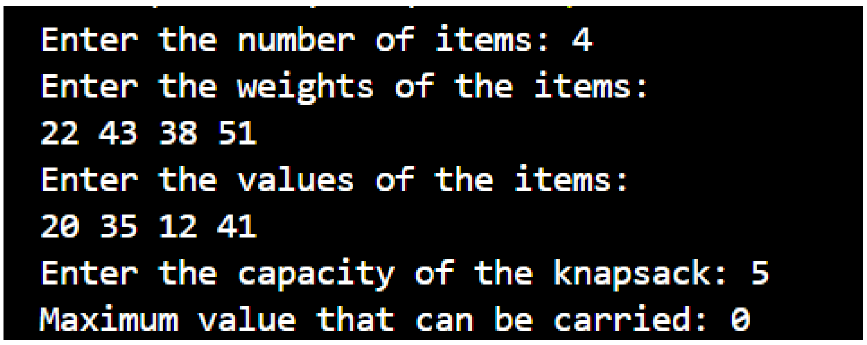
```
Enter number of workers/tasks: 4
Enter cost matrix:
2 4 6 8
1 3 5 7
10 15 20 25
5 2 9 0 3
Minimum cost for assignment: 19
```

4. Knapsack using brute force

```
#include <stdio.h>
#include <math.h>
int max(int a, int b) {
   return (a > b) ? a : b;
}

void evaluateSubset(int n, int weights[], int values[], int subset, int capacity, int *maxValue) {
   int totalWeight = 0;
   int totalValue = 0;

   for (int i = 0; i < n; i++) {
      if (subset & (1 << i)) {
         totalWeight += weights[i];
         totalValue += values[i];
      }
   }
   if (totalWeight <= capacity && totalValue > *maxValue) {
      *maxValue = totalValue;
   }
}
int main() {
   int n, capacity;
   printf("Enter the number of items: ");
   scanf("%d", &n);

   int weights[n], values[n];
```

```
    printf("Enter the weights of the items:\n");

    for (int i = 0; i < n; i++) {

        scanf("%d", &weights[i]);

    }

    printf("Enter the values of the items:\n");

    for (int i = 0; i < n; i++) {

        scanf("%d", &values[i]);

    }

    printf("Enter the capacity of the knapsack: ");

    scanf("%d", &capacity);

    int maxValue = 0;

    int totalSubsets = pow(2, n);


    for (int subset = 0; subset < totalSubsets; subset++) {

        evaluateSubset(n, weights, values, subset, capacity, &maxValue);

    }

    printf("Maximum value that can be carried: %d\n", maxValue);

    return 0;

}
```

OUTPUT:



```
Enter the number of items: 4
Enter the weights of the items:
22 43 38 51
Enter the values of the items:
20 35 12 41
Enter the capacity of the knapsack: 5
Maximum value that can be carried: 0
```