04/07/24.

ADA LAB 9.

KNAP SACK

```
#include <stdio.h>
int max(int a, int b) {
    return (a>b) ? a : b;
}
void knapsack(int n, int w, int weights[], int values[]) {
    int i, w;
    int dp[n+1][w+1];
for(i=0; i<=n; i++) {
        for(w=0, w<=W; w++) {
            if(i==0 || w==0) {
                dp[i][w] = 0;
            }
        else if (weights[i-1] <= w) {
            dp[i][w] = max(dp[i-1][w], dp[i-1][w - weights
                [i-1]] + values[i-1]);
        } else {
            dp[i][w] = dp[i-1][w];
        }
    }
}
printf("DP Table : \n");
for(i=0; i<=n; i++) {
    for(w=0; w<=W; w++) {
        printf("%d \t", dp[i][w]);
    }
    printf("\n");
}
pf("DP Table : \n");
for(i=0; i<=n; i++) {
    for(w=0; w<=W; w++) {
```

```
        pf("%d\t", dp[i][w]);
    }
    pf("\n");
}
pf("Selected items: ");
int res = dp[n][W];
w = W;
for(i = n; i > 0 && res > 0; i--) {
    if(res == dp[i-1][w])
        continue;
    else {
        pf("%d", i);
        res = res - values[i-1];
        w = w - weights[i-1];
    }
}
pf("\n Maximum profit : %d \n", dp[n][w]);
}
int main() {
    int n = 4;
    int weights[] = {2, 3, 4, 5};
    int values[] = {3, 4, 5, 8};
    int W = 5;
    knapsack(n, W, weights, values);
    return 0;
}
```

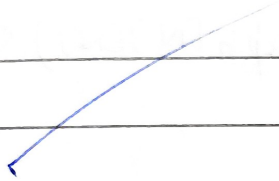
Output:

DP Table

0	0	0	0	0	0
0	0	3	3	3	3
0	0	3	4	4	7
0	0	3	4	5	7
0	0	3	4	5	8

Selected item : 4

Maximum profit : 8.



04/7/24

Prims Algorithm.

```
#include< stdio.h>
#include< limits.h>
#define N 4.
int minkey( int key[], int mstSet[]){
        int min = INT_MAX, min_index;
    for(int v=0; v<N; v++){
        if(mstSET[v] == 0 && key[v] < min)
            min = key[v], min_index = v;
    return min_index;
}
void printMST (int parent[], int graph[N][N]){
    pf("Edge \t Weight \n");
    for(int i=1; i<N; i++)
        pf("%d - %d - \t %d \n", parent[i], i,
            graph[i][parent[i]]);
}
void printMST(int graph[N][N]){
    int parent[N];
    int key[N];
    int mstSet[N];
    for(i=0; i<N; i++)
        key[i] = INT_MAX, mstSet[i] = 0;
    key[0]=0;
    parent[0] = -1;
    for(int count =0; count<N-1; count++){
        int u = minkey(key, mstSet);
        mstSet[u] = 1;
        for(int v=0; v<N; v++){
            if(graph[u][v] && mstSet[v]==0
            && graph[u][v] < key[v])
            parent[v] = u, key[v] = graph[u][v];
    }
    printMST(parent, graph);
```

```
int main(){
    int graph[N][N] = { { 0, 10, 6, 5 },
                        { 10, 0, 0, 15 },
                        { 6, 0, 0, 4 },
                        { 5, 15, 4, 0 } };

    primMST(graph);
    return 0;
}
```

Output:

Edge	weight
0-1	10
3-2	4
0-3	5.

11/7/24