Code: Knapsack Problem

```
#include<stdio.h>
struct item
{
   double wt;
   double pr;
   double pw;
}temp;

int main()
{
   int n,M,i,j,presentwt,rem_space;
   float totalp,rem;
   totalp=0;
   presentwt=0;
   n=3;
   M=20;
   struct item data[n];
   data[0].wt=18;
   data[1].wt=15;
   data[2].wt=10;
   data[0].pr=25;
   data[1].pr=24;
   data[2].pr=15;

   printf("Enter the capacity of the sack \n");
   scanf("%d",&M);
   printf("Enter the number of items \n");
   scanf("%d",&n);
```

```
for(i=0;i<n;i++)
{
   printf("Enter Weight for object %d ",i+1);
   scanf("%lf",&data[i].wt);
   printf("Enter Profit for object %d ",i+1);
   scanf("%lf",&data[i].pr);
   data[i].pw=(data[i].pr)/(data[i].wt);
}
printf("Data entered by User \n");
printf("Item  Profit \t Weight \t  P/W ratio \n");
for(i=0;i<n;i++)
{
   printf("%d  %lf \t %lf \t %lf \n",i+1,data[i].pr,data[i].wt,data[i].pw);
}

for(i=0;i<n-1;i++)
{
   for(j=0;j<n-i-1;j++)
   {
      if (data[j].pw < data[j+1].pw)
      {
         temp=data[j];
         data[j]=data[j+1];
         data[j+1]=temp;
      }

   }
}

printf("Sorted order \n");
printf("Item  Profit \t Weight \t  P/W ratio \n");
```

```
  for(i=0;i<n;i++)
  {
     printf("%d  %lf \t %lf \t %lf \n",i+1,data[i].pr,data[i].wt,data[i].pw);
  }

  printf("The analysis \n");
  printf("Item  Profit_Received \t Weight_Taken  \t  Space left in sack \n");
  for(i=0;i<n;i++)
  {
     if(presentwt+data[i].wt<=M)//Consider complete weight
     {
      presentwt+=data[i].wt;
      rem_space=M-presentwt;
      totalp+=data[i].pr;
      printf("%d  %lf \t\t %lf \t\t %d \n",i+1,data[i].pr,data[i].wt,rem_space);
     }
     else //Fractional Weight
     {
        rem=(M-presentwt);
        rem_space=M-presentwt-rem;
        totalp+=(data[i].pw)*rem;
        printf("%d   %lf \t\t  %lf \t  %d \n",i+1,(data[i].pw*rem),rem,rem_space);
        break;
     }


  }

  printf("Answer is %lf",totalp);
 return 0;
}
```

Output:

```
Enter the capacity of the sack
20
Enter the number of items
3
Enter Weight for object 1 18
Enter Profit for object 1 25
Enter Weight for object 2 15
Enter Profit for object 2 24
Enter Weight for object 3 10
Enter Profit for object 3 15
Data entered by User
Item  Profit     Weight          P/W ratio
1  25.000000     18.000000      1.388889
2  24.000000     15.000000      1.600000
3  15.000000     10.000000      1.500000
Sorted order
Item  Profit     Weight          P/W ratio
1  24.000000     15.000000      1.600000
2  15.000000     10.000000      1.500000
3  25.000000     18.000000      1.388889
The analysis
Item   Profit_Received    Weight_Taken     Space left in sack
1   24.000000            15.000000             5
2   7.500000             5.000000              0
Answer is 31.500000
```