**Exercise 5**

We have a sequence of numbers S = (1,4,6,11,13,20,35). Can we split all these numbers into two parts S1 and S2 with the same sum ?

Propose a way to solve the partition problem from the previous slide using genetic algorithm. Important questions to answer:

How is the chromosome coded? What do the genes mean?

How does the fitness function work?  
Give an example of two chromosomes and compute their fitness.

S = (1,4,6,11,13,20,35)

We divide the S set into two set where the sum is equal

S1 = (35,6,4); sum = 45

S2 = (1,11,13,20); sum = 45

I assigned all the numbers that goes to the **S2 set with 1** and all the numbers that goes to **S1 set with 0**

S1 = 0

S2 = 1

Chromosome coded:

Solution = **[1,0,0,1,1,1,0]**

**Fitness function:**

I compared the sum of the S1 with the sum of S2 if they are the same it is really good and if there is big difference between the sum of S1 and the sum of S2 it means that it is really bad.

Grade = | SumS1 – SumS2|

In my case the best grade is 0 and the worst is 90, for python is a problem, to avoid it we can add a minus:

Grade = -| SumS1 – SumS2|

Or

Grade = 1/ (| SumS1 – SumS2| +1)