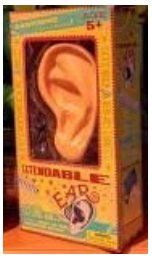
Practice 1 – Genetic Algorithms

Fred and George Weasley are preparing themselves for a new term in ***Hogwarts School of Witchcraft and Wizardry***. They are planning to sell the new products from their joke store ***Weasleys' Wizard Wheezes*** to the students at the school. So, they are preparing a knapsack with as many products as possible to make a bigger profit. Mrs. Weasley, their mother, has forbidden them to sell these products, so they must carry them hidden using a small knapsack. Currently, they have 10 products of each type.

Knapsack capacity: 30 pounds.

The characteristics and number of products they currently have are:

Product	Characteristics
	Name: Decoy Detonators Weight: 4 pounds Price: 10 galleons
	Name: Love Potion Weight: 2 pounds Price: 8 galleons
	Name: Extendable Ears Weight: 5 pounds Price: 12 galleons
	Name: Skiving Snackbox Weight: 5 pounds Price: 6 galleons

Product	Characteristics
	Name: Fever Fudge Weight: 2 pounds Price: 3 galleons
	Name: Puking Pastilles Weight: 1.5 pounds Price: 2 galleons
	Name: Nosebleed Nougat Weight: 1 pounds Price: 2 galleons

Restrictions: In addition to the knapsack capacity restriction, the brothers have decided that there must be at least 3 Love Potions and 2 Skiving Snackbox, the former because is highly demanded and the latter because includes an assortment of their products.

We are helping the Weasley Brother to pack their products using a genetic algorithm with the following characteristics:

Population	10 chromosomes
Generation	50
Crossover probability	0.85
Mutation probability	0.1
Parents selection	Roulette Wheel
Crossover	Uniform Crossover (u=<0.5)
Mutation	According with codification of the genes
Survivor selection	Generational Update Weaker parent replacement