

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	Product	Characteristics
	Name: Decoy Detonators Weight: 4 pounds Price: 10 galleons		Name: Fever Fudge Weight: 2 pounds Price: 3 galleons
	Name: Love Potion Weight: 2 pounds Price: 8 galleons		Name: Puking Pastilles Weight: 1.5 pounds Price: 2 galleons
	Name: Extendable Ears Weight: 5 pounds Price: 12 galleons		Name: Nosebleed Nougat Weight: 1 pounds Price: 2 galleons
	Name: Skiving Snackbox Weight: 5 pounds Price: 6 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:

Población	10 cromosomas
Generación	50
Probabilidad de cruza	0.85
Probabilidad de mutación	0.1
Selección de padres	Ruleta
Método de cruza	Cruza uniforme ($u \leq 0.5$)
Método de mutación	Mutación uniforme
Selección de sobreviviente	Generacional con reemplazo del padre más débil