

Cell Phone Company problem:

- **Population Model** : Steady state model with probability 99%
- **Population size** : 100
- **Maximum number of generations** : 50
- **mutation probability** : 5% (per individual)
- **Selection pressure** : in parent selection (tournament selection with size 10 , roulette wheel selection)
- **Crossover method** : one-point & uniform & arithmetic

Representation:

Array with size S(max antenna number used) , each element created as below:

(a , x , y)

a : antenna type

x : x location of antenna

y : y location of antenna

- comparing crossover methods and parent selection methods on bellow algorithm parameters:

GRID_SIZE = 50

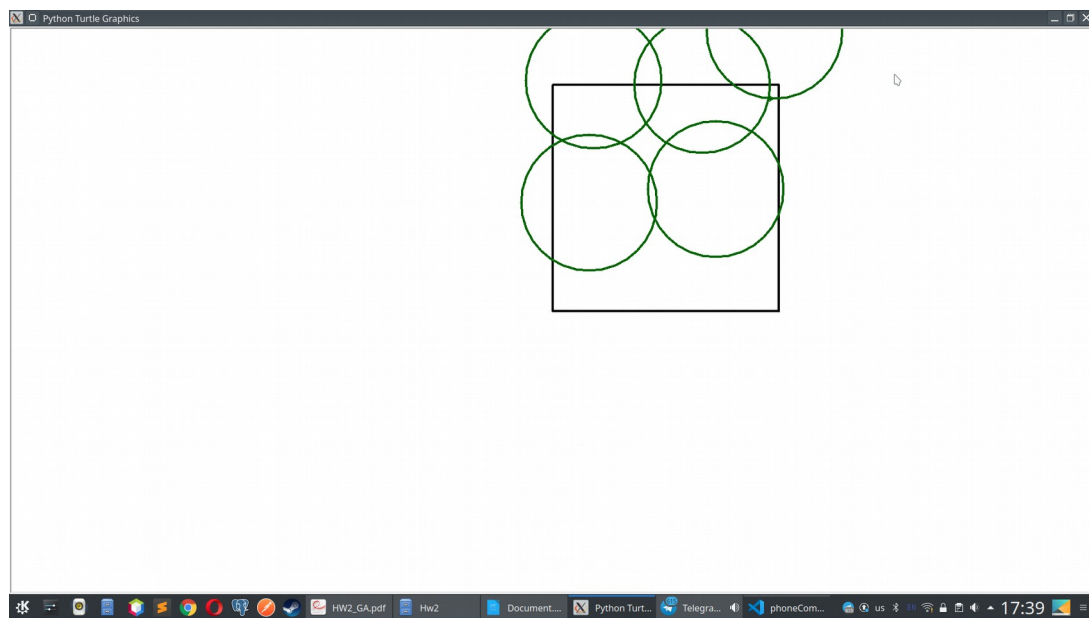
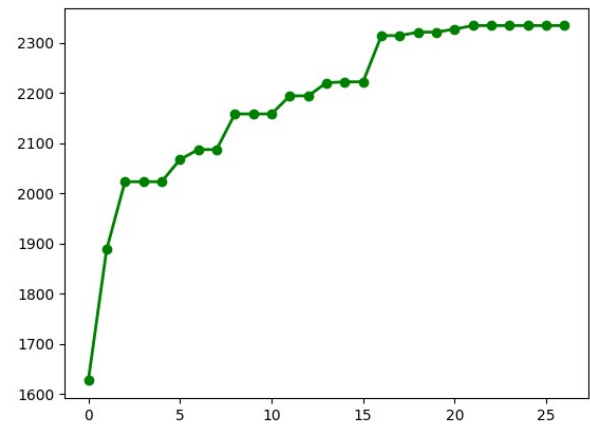
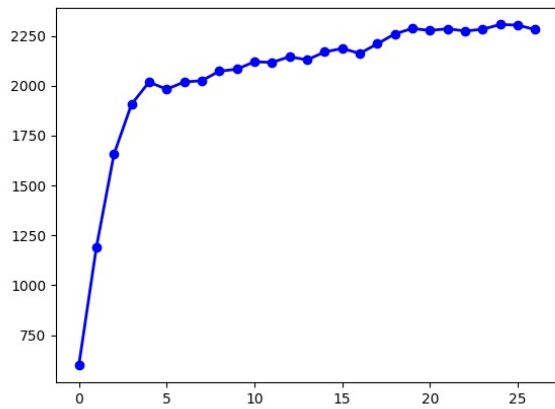
S = 5 # maximum number of antennas

K = 5 # antenna types

COSTS = [0, 0.5, 1, 3, 5, 7, 10, 12, 15, 20, 24]

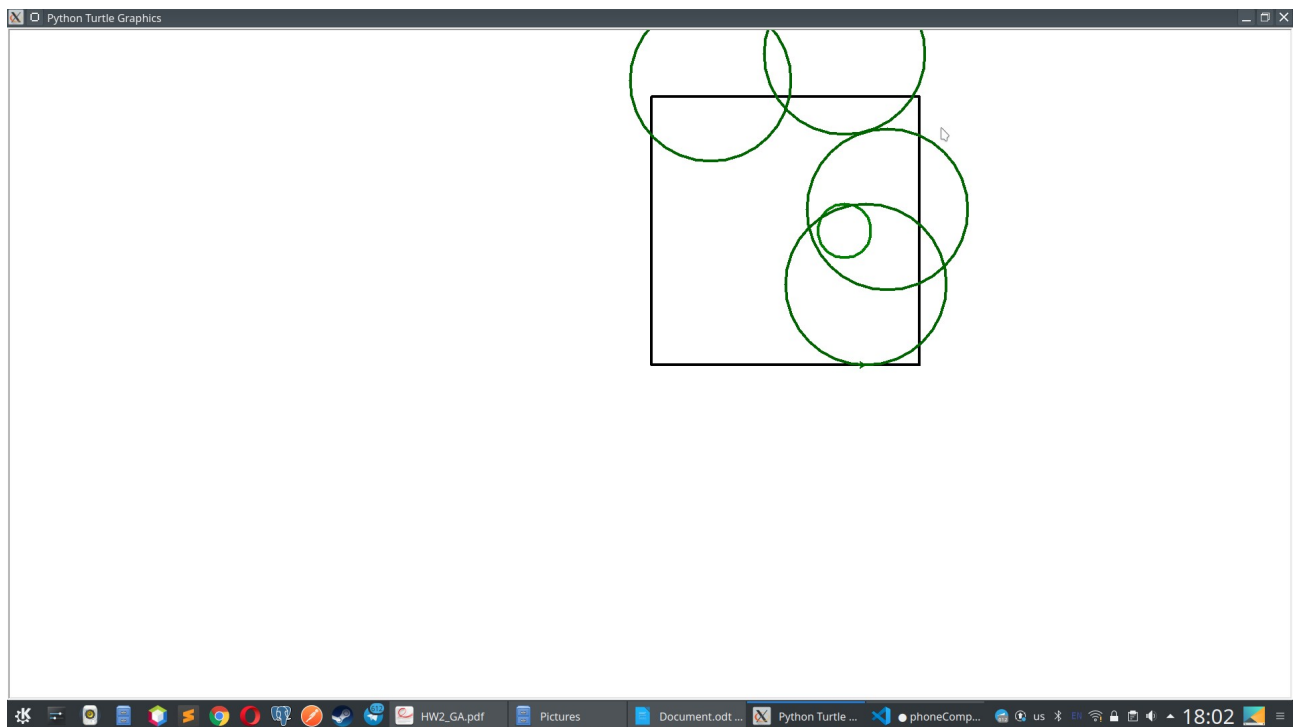
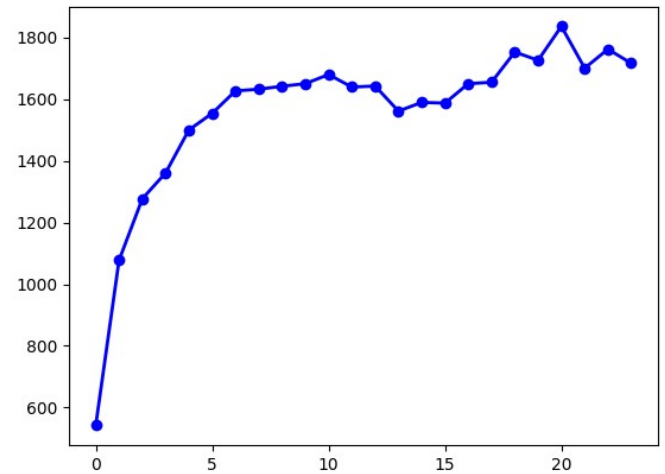
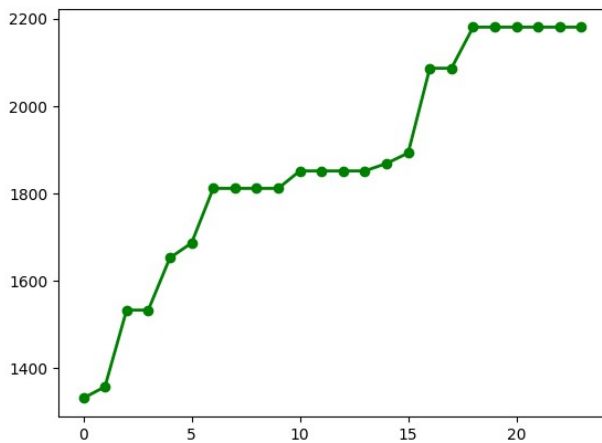
RADIUS = [0, 2, 5, 8, 10, 15, 20, 25, 30, 32, 40]

uniform:



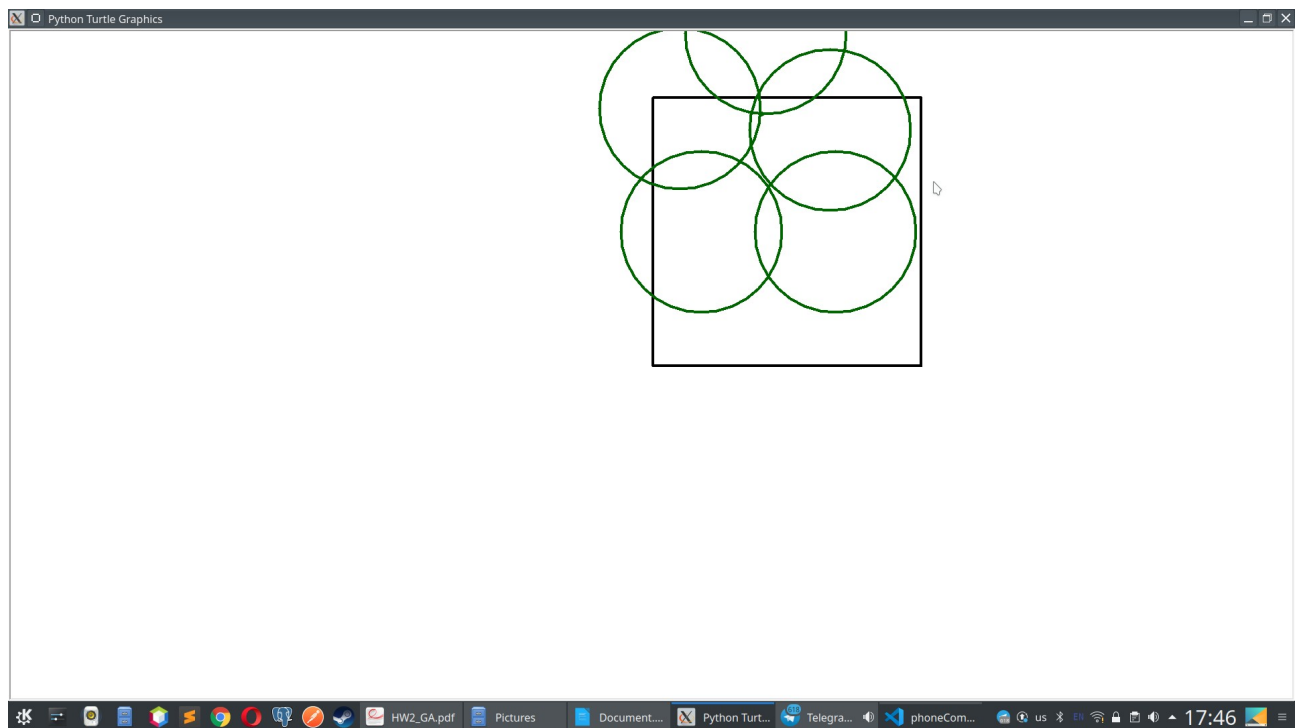
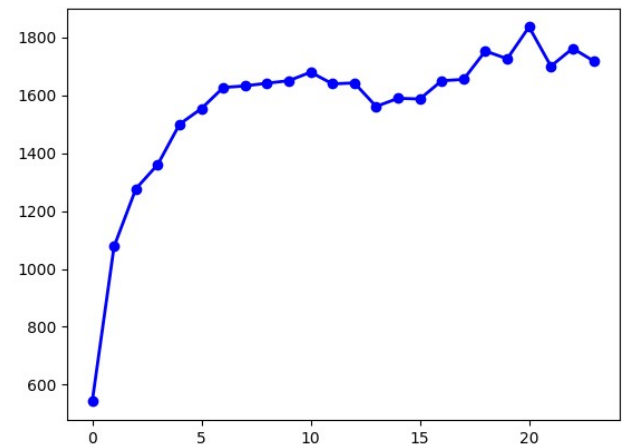
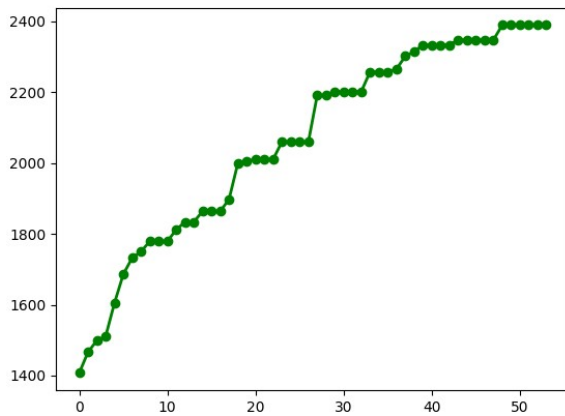
one Point:

('generation : ', 24, ' ', [(5, 33, 29), (5, 9, 10), (5, 34, 10), (5, 5, 33), (5, 21, 47)], 2239)



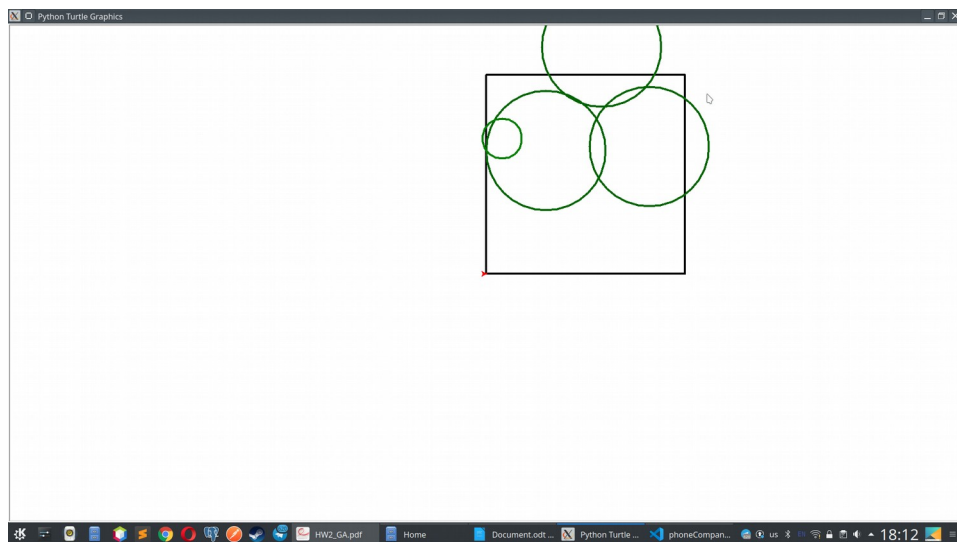
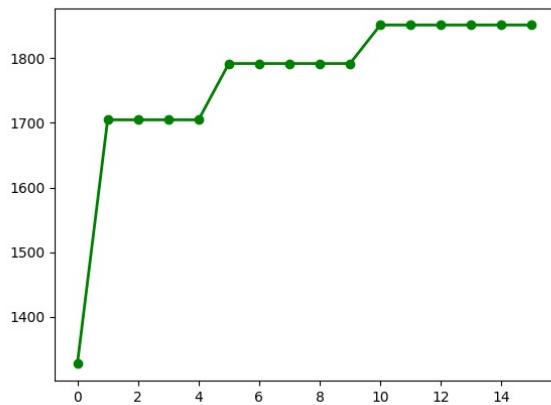
arithmetic:

('generation : ', 54, ' ', [(5, 11, 38), (2, 36, 20), (5, 44, 14), (5, 36, 43), (5, 40, 0)], 2384)



selection with roulette wheel:

('generation : ', 16, ' ', ' ', [(5, 15, 16), (5, 41, 17), (5, 29, 42), (2, 4, 29), (0, 0, 0)], 1851)



results:

compare crossover methods:

one-point :

best → 2239 in 24 generations

uniform :

best → 2250 in 27 generations

arithmetic :

best → 2384 in 54 generations

compare parent selection methods with arithmetic method as crossover:

tournament :

best → 2384 in 54 generations

roulette wheel :

best → 1851 in 16 generations