* TSP problem : Ehsan\_Khademi stuID:40028733
  + Items requested in problems :
    - Using genetic algorithm
    - Implement of selection with use following both two method:
      * Greedy selection method
      * Roulette wheel selection method
    - Implement of mutation with use following two both method:
      * Single point mutation method
      * Double point mutation method
    - Implement of following combination
      * Single point combination method
      * Multipoint combination method
* Point one:
  + Is considered the start node from 0 value
  + Is used the following method to initialize and starting from node 0:
* def initialpopulation(self,size):  
   population = []  
   for \_ in range(size):  
   individual = list(range(1,len(matrix)))  
   random.shuffle(individual)  
   individual.insert(0, 0)  
   individual.extend([0])  
   population.append(individual)  
   return population
* Point two:
  + Initialize the population equal to 100 (that we can tune any value )
  + Initialize the generation equal to 500(5 \* iterate)
* Point three:
  + In roulette wheel seleciton the order may not be followed
* def roulette\_wheel\_selection(self, population):  
   fitness\_scores = [self.fitness(p) for p in population]  
   total\_fitness = sum(fitness\_scores)  
   selection\_probs = [f / total\_fitness for f in fitness\_scores]  
   # Normalize the probabilities  
   selection\_probs = [float(i)/sum(selection\_probs) for i in selection\_probs]  
   return population[np.random.choice(len(population), p=selection\_probs)]
  + In greedy selecrion the order followed
* Point four:
  + In crossover we consider an point inform to random between length
  + In mutation select an gen inform random between existed gen in chromosme