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CS 767 Draft Assignment 5

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Hand in a draft of Assignment 5, using the Word template supplied, with (only) the following sections drafted:

2 (i.e., complete):

3.

def crossover\_one\_hot(parent1, parent2, crossover\_point, max\_cities=4):

import numpy as np

# Function to convert one-hot vector to city index

def one\_hot\_to\_index(one\_hot\_vector):

return np.argmax(one\_hot\_vector)

# Copy head segment from Parent 1

child\_route = parent1[:crossover\_point]

child\_cities = set(one\_hot\_to\_index(city) for city in child\_route)

# Append tail segment from Parent 2, skipping duplicates

for city in parent2[crossover\_point:]:

city\_idx = one\_hot\_to\_index(city)

if city\_idx not in child\_cities:

child\_route.append(city)

child\_cities.add(city\_idx)

# Ensure all cities are included

total\_cities = max\_cities

if len(child\_cities) < total\_cities:

# Find missing cities

missing\_cities = set(range(total\_cities)) - child\_cities

# Append missing cities in order of appearance in Parent 2

for city in parent2:

city\_idx = one\_hot\_to\_index(city)

if city\_idx in missing\_cities:

child\_route.append(city)

child\_cities.add(city\_idx)

missing\_cities.remove(city\_idx)

if not missing\_cities:

break

# Return to starting city

if not np.array\_equal(child\_route[0], child\_route[-1]):

child\_route.append(child\_route[0])

return child\_route

If the cross over point was at index 1, the parent head would be boston, and the tail would be London, Mumbai, Shanghai, and Boston. Then we visit the unvisited cities, until we return to Boston. Then we make a check to see if all cities have been visited.

4.