Q.3) fuzzy union and intersection of two fuzzy sets A and B

#fuzzy union and intersection of two fuzzy sets A and B

```python
import numpy as np
import matplotlib.pyplot as plt

# Define the range
x = np.arange(100, 201)

# Assign random membership values
np.random.seed(42)  # For reproducibility, sets the seed for the random number generator to ensure the results are reproducible.
membership_A = np.random.rand(len(x))  #arrays of random values between 0 and 1, representing the membership values of elements in fuzzy sets A and B, respectively.
membership_B = np.random.rand(len(x))

# Define fuzzy union and intersection
fuzzy_union = np.maximum(membership_A, membership_B) #takes the element-wise maximum of the membership values of sets A and B.
fuzzy_intersection = np.minimum(membership_A, membership_B) # takes the element-wise minimum of the membership values of sets A and B.

# Plot the membership functions
plt.figure(figsize=(12, 8))  #creates a new figure, for plotting with a width of 12 inches and a height of 8 inches.

plt.plot(x, membership_A, label='Fuzzy Set A', marker='o') #plots the data points membership_A against x on the current figure, adds a label 'Fuzzy Set A' to the plot for the legend, and uses 'o' markers to indicate each data point.
plt.plot(x, membership_B, label='Fuzzy Set B', marker='o')
plt.plot(x, fuzzy_union, label='Fuzzy Union (A ∪ B)', marker='o')
plt.plot(x, fuzzy_intersection, label='Fuzzy Intersection (A ∩ B)', marker='o')
```

plt.title('Fuzzy Sets and Their Union and Intersection')

plt.xlabel('Elements')

plt.ylabel('Membership Value')

plt.legend() #adds a legend to the plot, which displays the labels specified in the label argument of the plt.plot() function.(label=This helps identify different lines or markers in the plot by providing a key that explains what each line or marker represents.)

plt.grid(True) #adds a grid to the plot for better readability

plt.show()