9. Build a k-d tree contining the following points in the plane with coordinates:

(50, 50), (20, 35), (60,15), (30, 40), (50, 40), (40, 50), (15, 60), (15, 35), (35, 40).

Insert the points into the tree in the given order.

**Solution:**

(50, 50)

(20, 35) (60, 15)

(30, 40) (50, 40)

(15, 60) (40, 50)

(15, 35) (35, 40)

12. The outer loop iterates through x-coordinates of the points in the plane starting from x =10 and ending at x = 40 with step = 10. The inner loop iterates through the y-coordinates of the points starting from y = 50 and ending at y = 80 with step = 10. Each point is inserted into an originally empty k-d tree in the order imposed by the progress of the loops. Draw the resulting k-d tree.

**Solution:**

Points are inserted into an empty k-d tree in the following order: (10,50), (10,60), (10,70), (10,80), (20,50), (20,60), (20,70), (20,80), (30,50), (30,60), (30,70), (30,80), (40,50), (40,60), (40,70), (40,80).

(10,50)

(10,60)

(20,50) (10,70)

(30,50) (10,80)

(40,50) (20,60) (20,80)

(20,70) (30,80)

(30,60) (30,70) (40,80)

(40,60) (40,70)

13. Delete the points (10,50), (20,60), (30,70), (30,60) (in this order) from the k-d tree built in the previous problem. Draw the resulting k-d tree.

**Solution:**

Delete(10,50)

(10,60)

(20,60)

(20,50) (10,70)

(30,50) (10,80)

(40,50) (20,70) (20,80)

(30,70) (30,80)

(30,60) (40,70) (40,80)

(40,60)

Delete(20,60)

(10,60)

(30,60)

(20,50) (10,70)

(30,50) (10,80)

(40,50) (20,70) (20,80)

(30,70) (30,80)

(40,60) (40,70) (40,80)

Delete(30,70)

(10,60)

(30,60)

(20,50) (10,70)

(30,50) (10,80)

(40,50) (20,70) (20,80)

(40,70) (30,80)

(40,60) (40,80)

Delete(30,60)

(10,60)

(40,60)

(20,50) (10,70)

(30,50) (10,80)

(40,50) (20,70) (20,80)

(40,70) (30,80)

(40,80)