

```

/**
 * @Author: Shivam Patel
 * @Andrew_ID: shpatel
 * @Course: 95-771 Data Structures and Algorithms for Information
Processing
 * @Assignment_Number: Project 2
 */

```

Initial Prompt to User

```

"C:\Program Files\Eclipse Adoptium\jdk-17.0.4.101-hotspot\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA 2022.2.1\lib\idea_rt

```

Crime file loaded into 2d tree with 27218 records.

What would you like to do?

- 1: Print inOrder
- 2: Print preOrder
- 3: Print levelOrder
- 4: Print postOrder
- 5: Print reverseLevelOrder
- 6: Search for points within rectangle
- 7: Search for nearest neighbor
- 8: Quit

Enter your option: |

Option 1 Output – In Order Print (last few results)

```

TwoDTreeDriver x
1373662.497,427410.0193,34532,825 FREEPORT RD,ROBBERY,7/17/94,120100,40.48683501,-79.88874264
1373676.714,427414.9502,34304,831 FREEPORT RD,ROBBERY,12/1/93,120100,40.48684948,-79.88869198
1373690.93,427419.881,34186,837 FREEPORT RD,ROBBERY,8/5/93,120100,40.48686396,-79.88864131
1373836.029,427401.737,35399,928 FREEPORT RD,ROBBERY,11/30/96,120100,40.48682381,-79.88811823
1373719.363,427429.7428,35553,849 FREEPORT RD,ROBBERY,5/3/97,120100,40.48689291,-79.88853998
1373733.579,427434.6736,36541,855 FREEPORT RD,ROBBERY,1/16/00,120100,40.48690739,-79.88848931
1373804.904,427437.6709,33999,907 FREEPORT RD,AGGRAVATED ASSAULT,1/30/93,120100,40.48692035,-79.88823322
1373785.645,427452.7322,34609,877 FREEPORT RD,ROBBERY,10/2/94,120100,40.4869604,-79.88830375
1373785.645,427452.7322,36198,877 FREEPORT RD,ROBBERY,2/7/99,120100,40.4869604,-79.88830375
1373785.645,427452.7322,36382,877 FREEPORT RD,ROBBERY,8/10/99,120100,40.4869604,-79.88830375
1373804.904,427437.6709,34139,907 FREEPORT RD,AGGRAVATED ASSAULT,6/19/93,120100,40.48692035,-79.88823322
1373804.904,427437.6709,36126,907 FREEPORT RD,AGGRAVATED ASSAULT,11/27/98,120100,40.48692035,-79.88823322
1373804.904,427437.6709,36126,907 FREEPORT RD,ROBBERY,11/27/98,120100,40.48692035,-79.88823322
1373818.693,427464.1949,34839,891 FREEPORT RD,ROBBERY,5/20/95,120100,40.48699405,-79.88818597
1373840.602,427402.395,33083,932 FREEPORT RD,ROBBERY,7/29/90,120100,40.48682592,-79.88810185
1373845.245,427403.0629,35401,936 FREEPORT RD,ROBBERY,12/2/96,120100,40.48682806,-79.88808522
1373859.102,427405.0566,33164,948 FREEPORT RD,ROBBERY,10/18/90,120100,40.48683445,-79.88803559
1373859.102,427405.0566,33558,948 FREEPORT RD,ROBBERY,11/16/91,120100,40.48683445,-79.88803559
1373904.546,427480.7918,35741,1005 FREEPORT RD,ROBBERY,11/7/97,120100,40.4870453,-79.88787885
1373960.889,427487.7875,36717,1009 FREEPORT RD,ROBBERY,7/10/00,120100,40.48706824,-79.88767696

What would you like to do?
1: Print inOrder

```

Option 2 Output – Pre Order Print (last few results)

```
TwoDTreeDriver X
1371091.998,427874.6529,36212,800 FREEPORT RD,RAPE,2/21/99,120100,40.4879388,-79.89802188
1373804.904,427437.6709,33999,907 FREEPORT RD,AGGRAVATED ASSAULT,1/30/93,120100,40.48692035,-79.88823322
1373690.93,427419.881,34186,837 FREEPORT RD,ROBBERY,8/5/93,120100,40.48686396,-79.88864131
1373676.714,427414.9502,34304,831 FREEPORT RD,ROBBERY,12/1/93,120100,40.48684948,-79.88869198
1373662.497,427410.0193,34532,825 FREEPORT RD,ROBBERY,7/17/94,120100,40.48683501,-79.88874264
1373836.029,427401.737,35399,928 FREEPORT RD,ROBBERY,11/30/96,120100,40.48682381,-79.88811823
1373719.363,427429.7428,35553,849 FREEPORT RD,ROBBERY,5/3/97,120100,40.48689291,-79.88853998
1373733.579,427434.6736,36541,855 FREEPORT RD,ROBBERY,1/16/00,120100,40.48690739,-79.88848931
1373804.904,427437.6709,34139,907 FREEPORT RD,AGGRAVATED ASSAULT,6/19/93,120100,40.48692035,-79.88823322
1373785.645,427452.7322,34609,877 FREEPORT RD,ROBBERY,10/2/94,120100,40.4869604,-79.88830375
1373785.645,427452.7322,36198,877 FREEPORT RD,ROBBERY,2/7/99,120100,40.4869604,-79.88830375
1373785.645,427452.7322,36382,877 FREEPORT RD,ROBBERY,8/10/99,120100,40.4869604,-79.88830375
1373818.693,427464.1949,34839,891 FREEPORT RD,ROBBERY,5/20/95,120100,40.48699405,-79.88818597
1373804.904,427437.6709,36126,907 FREEPORT RD,AGGRAVATED ASSAULT,11/27/98,120100,40.48692035,-79.88823322
1373804.904,427437.6709,36126,907 FREEPORT RD,ROBBERY,11/27/98,120100,40.48692035,-79.88823322
1373859.102,427405.0566,33164,948 FREEPORT RD,ROBBERY,10/18/90,120100,40.48683445,-79.88803559
1373845.245,427403.0629,35401,936 FREEPORT RD,ROBBERY,12/2/96,120100,40.48682806,-79.88808522
1373859.102,427405.0566,33558,948 FREEPORT RD,ROBBERY,11/16/91,120100,40.48683445,-79.88803559
1373904.546,427480.7918,35741,1005 FREEPORT RD,ROBBERY,11/7/97,120100,40.4870453,-79.88787885
1373960.889,427487.7875,36717,1009 FREEPORT RD,ROBBERY,7/10/00,120100,40.48706824,-79.88767696

What would you like to do?
1: Print inOrder
0: Print preOrder
```

Option 3 Output – Level Order Print (last few results)

```
TwoDTreeDriver X
1347858.485,412376.921,36551,2000 CENTRE AV,ROBBERY,1/26/00,30500,40.44383012,-79.98011785
1369160.785,414207.8477,35828,7100 PENN AV,AGGRAVATED ASSAULT,2/2/98,140600,40.45030568,-79.90376474
1347858.485,412376.921,36553,2000 CENTRE AV,ROBBERY,1/28/00,30500,40.44383012,-79.98011785
1369160.785,414207.8477,35844,7100 PENN AV,ROBBERY,2/18/98,140600,40.45030568,-79.90376474
1347858.485,412376.921,36571,2000 CENTRE AV,RAPE,2/15/00,30500,40.44383012,-79.98011785
1369160.785,414207.8477,35848,7100 PENN AV,RAPE,2/22/98,140600,40.45030568,-79.90376474
1347858.485,412376.921,36615,2000 CENTRE AV,ROBBERY,3/30/00,30500,40.44383012,-79.98011785
1369160.785,414207.8477,35855,7100 PENN AV,RAPE,3/1/98,140600,40.45030568,-79.90376474
1347858.485,412376.921,36615,2000 CENTRE AV,ROBBERY,3/30/00,30500,40.44383012,-79.98011785
1369160.785,414207.8477,35901,7100 PENN AV,ROBBERY,4/16/98,140600,40.45030568,-79.90376474
1347858.485,412376.921,36631,2000 CENTRE AV,ROBBERY,4/15/00,30500,40.44383012,-79.98011785
1369160.785,414207.8477,35912,7100 PENN AV,RAPE,4/27/98,140600,40.45030568,-79.90376474
1347858.485,412376.921,36668,2000 CENTRE AV,ROBBERY,5/22/00,30500,40.44383012,-79.98011785
1369160.785,414207.8477,36144,7100 PENN AV,RAPE,12/15/98,140600,40.45030568,-79.90376474
1347858.485,412376.921,36702,2000 CENTRE AV,ROBBERY,6/25/00,30500,40.44383012,-79.98011785
1369160.785,414207.8477,36161,7100 PENN AV,ROBBERY,1/1/99,140600,40.45030568,-79.90376474
1347858.485,412376.921,36842,2000 CENTRE AV,RAPE,11/12/00,30500,40.44383012,-79.98011785
1369160.785,414207.8477,36274,7100 PENN AV,RAPE,4/24/99,140600,40.45030568,-79.90376474
1369160.785,414207.8477,36378,7100 PENN AV,ROBBERY,8/6/99,140600,40.45030568,-79.90376474
1369160.785,414207.8477,36418,7100 PENN AV,AGGRAVATED ASSAULT,9/15/99,140600,40.45030568,-79.90376474
1369181.725,414227.6744,36557,100 N LANG AV,ROBBERY,2/1/00,140500,40.45036149,-79.90369126

What would you like to do?
```


Option 4 Output – Post Order Print (last few results)

```
TwoDTreeDriver x
1373804.904,427437.6709,34139,907 FREEPORT RD,AGGRAVATED ASSAULT,6/19/93,120100,40.48692035,-79.88823322
1373804.904,427437.6709,33999,907 FREEPORT RD,AGGRAVATED ASSAULT,1/30/93,120100,40.48692035,-79.88823322
1373662.497,427410.0193,33249,825 FREEPORT RD,ROBBERY,1/11/91,120100,40.48683501,-79.88874264
1373836.029,427401.737,33107,928 FREEPORT RD,ROBBERY,8/22/90,120100,40.48682381,-79.88811823
1373845.245,427403.0629,35401,936 FREEPORT RD,ROBBERY,12/2/96,120100,40.48682806,-79.88808522
1373960.889,427487.7875,36717,1009 FREEPORT RD,ROBBERY,7/10/00,120100,40.48706824,-79.88767696
1373904.546,427480.7918,35741,1005 FREEPORT RD,ROBBERY,11/7/97,120100,40.4870453,-79.88787885
1373859.102,427405.0566,33558,948 FREEPORT RD,ROBBERY,11/16/91,120100,40.48683445,-79.88803559
1373859.102,427405.0566,33164,948 FREEPORT RD,ROBBERY,10/18/90,120100,40.48683445,-79.88803559
1373840.602,427402.395,33083,932 FREEPORT RD,ROBBERY,7/29/90,120100,40.48682592,-79.88810185
1371636.27,421485.8696,32953,7165 CHURCHLAND ST,ROBBERY,3/21/90,120100,40.47044323,-79.89550771
1371091.998,427874.6529,32893,800 FREEPORT RD,MURDER/MANSLAUGHTER,1/20/90,120100,40.4879388,-79.89802188
1373200.078,421483.9266,32893,1685 BROADHEAD ST,AGGRAVATED ASSAULT,1/20/90,120200,40.47054204,-79.88988842
1370725.814,423718.5169,32879,7150 HIGHLAND DR,ROBBERY,1/6/90,120100,40.47650923,-79.89897443
1366925.974,420173.9289,32877,600 LARIMER AV,ROBBERY,1/4/90,120400,40.46652772,-79.91231732
1360172.801,419642.5322,32875,5400 PENN AV,AGGRAVATED ASSAULT,1/2/90,80900,40.4646131,-79.936534
1361745.729,419343.2848,32874,5600 PENN AV,AGGRAVATED ASSAULT,1/1/90,111500,40.46389868,-79.93085611
1357049.25,418429.9175,32874,4779 LIBERTY AV,ROBBERY,1/1/90,80900,40.46107271,-79.94764804
1359951.481,410726.1273,32874,320 SCHENLEY RD,ROBBERY,1/1/90,140100,40.44013011,-79.93653583
1348656.471,399538.5342,32874,100 BONIFAY ST,ROBBERY,1/1/90,160600,40.40865518,-79.9760891

What would you like to do?
1: Print inOrder
```

Option 5 Output – Reverse Level Order Print (last few results)

```
TwoDTreeDriver x
1342861.278,412568.5811,32878,900 PENN AV,ROBBERY,1/5/90,20100,40.4440083,-79.99808384
1346775.118,410574.5466,32888,1600 FIFTH AV,AGGRAVATED ASSAULT,1/15/90,10300,40.43880904,-79.98384521
1348246.347,407544.4022,32885,1916 WHARTON SQ,ROBBERY,1/12/90,170200,40.43059596,-79.9782867
1341790.155,411339.012,32879,200 FORBES AV,ROBBERY,1/6/90,20100,40.44055933,-80.00181837
1336665.254,402928.8166,32881,590 CRANE AV,ROBBERY,1/8/90,191600,40.41712081,-80.01944808
1361745.729,419343.2848,32874,5600 PENN AV,AGGRAVATED ASSAULT,1/1/90,111500,40.46389868,-79.93085611
1348909.156,413189.8419,32876,2200 WYLIE AV,MURDER/MANSLAUGHTER,1/3/90,50100,40.44613364,-79.97641775
1361989.427,404292.4099,32877,4250 MURRAY AV,ROBBERY,1/4/90,151700,40.42261319,-79.92864623
1351340.433,410399.55,32875,183 BURROWS ST,AGGRAVATED ASSAULT,1/2/90,51000,40.43864462,-79.96743325
1348176.524,412807.903,32875,2100 WYLIE AV,ROBBERY,1/2/90,50100,40.44503482,-79.97901462
1347891.491,412839.7694,32875,18 DAVENPORT ST,AGGRAVATED ASSAULT,1/2/90,50100,40.44510252,-79.98004129
1347675.822,410464.9215,32882,100 DINWIDDIE ST,RAPE,1/9/90,30500,40.4385707,-79.98060042
1340515.683,407015.9285,32879,75 WYOMING ST,ROBBERY,1/6/90,191400,40.42860705,-80.00599894
1357049.25,418429.9175,32874,4779 LIBERTY AV,ROBBERY,1/1/90,80900,40.46107271,-79.94764804
1353029.519,402359.7471,32875,3247 ARLINGTON AV,ROBBERY,1/2/90,160400,40.4166985,-79.96064401
1348176.524,412807.903,32875,2100 WYLIE AV,RAPE,1/2/90,50100,40.44503482,-79.97901462
1346005.636,411360.5258,32876,1400 CENTRE AV,ROBBERY,1/3/90,20100,40.4409124,-79.98668027
1359951.481,410726.1273,32874,320 SCHENLEY RD,ROBBERY,1/1/90,140100,40.44013011,-79.93653583
1348102.398,412548.4207,32875,2017 CENTRE AV,ROBBERY,1/2/90,50100,40.44431764,-79.97925733
1348656.471,399538.5342,32874,100 BONIFAY ST,ROBBERY,1/1/90,160600,40.40865518,-79.9760891

What would you like to do?
1: Print inOrder
```

Option 6 Output – Search for points within Rectangle

```
TwoDTreeDriver x
Enter your option: 6
Enter a rectangle bottom left (X1,Y1) and top right (X2, Y2) as four doubles each separated by a space.
1357605.688 411838.5393 1358805.688 413038.5393
Searching for points within (1357605.688,411838.5393) and (1358805.688,413038.5393)

Examined 25 nodes during search.
Found 9 crimes.

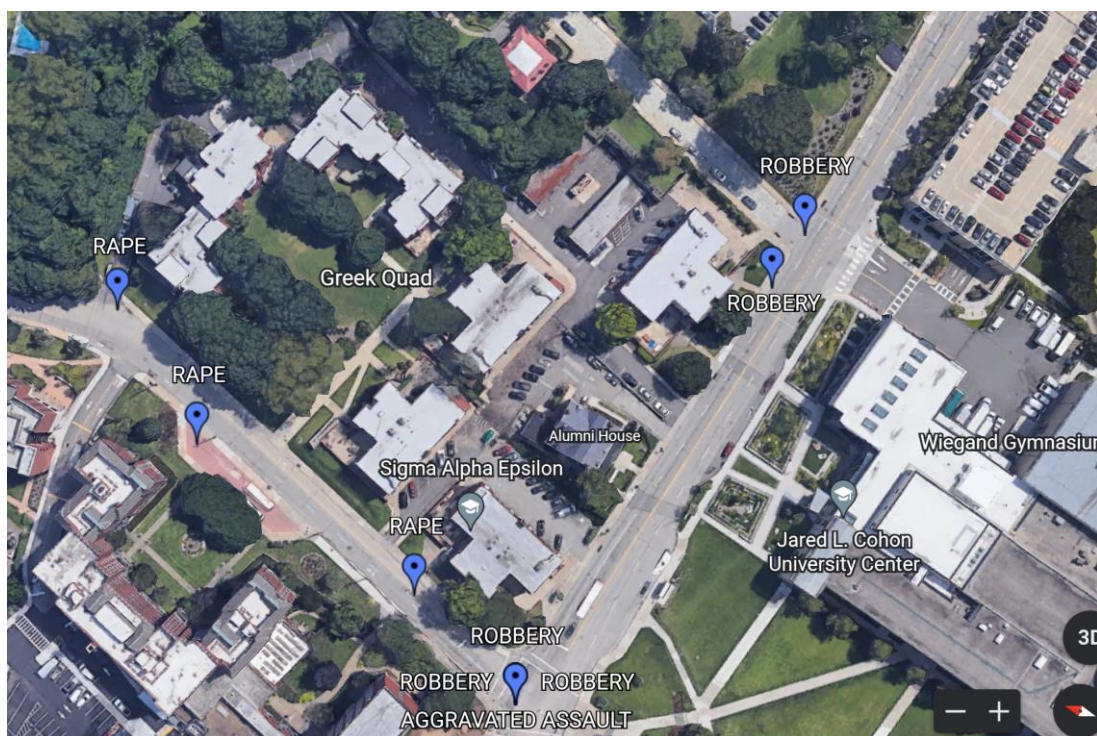
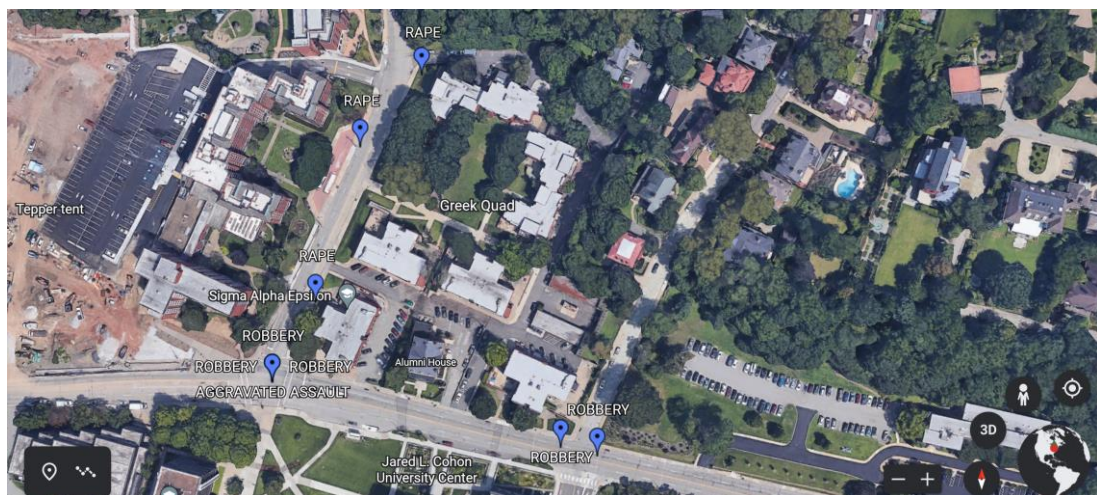
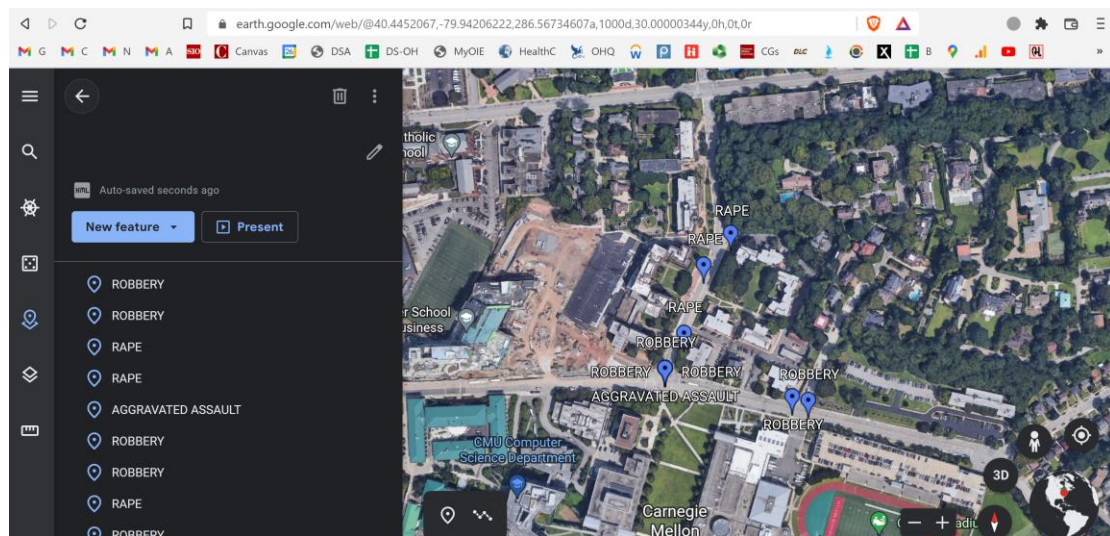
1358205.688,412438.5393,32898,5000 FORBES AV,ROBBERY,1/25/90,140100,40.44471042,-79.94295871
1358701.856,412316.9622,32969,5050 FORBES AV,ROBBERY,4/6/90,140100,40.44441059,-79.94116573
1358446.935,412903.5158,33181,1045 MOREWOOD AV,RAPE,11/4/90,140100,40.44600282,-79.94213366
1358275.087,412559.1355,33347,1085 MOREWOOD AV,RAPE,4/19/91,140100,40.44504608,-79.9427202
1358205.688,412438.5393,33570,5000 FORBES AV,AGGRAVATED ASSAULT,11/28/91,140100,40.44471042,-79.94295871
1358205.688,412438.5393,34074,5000 FORBES AV,ROBBERY,4/15/93,140100,40.44471042,-79.94295871
1358205.688,412438.5393,34590,5000 FORBES AV,ROBBERY,9/13/94,140100,40.44471042,-79.94295871
1358349.449,412795.1595,33641,1060 MOREWOOD AV,RAPE,2/7/92,140100,40.44569883,-79.94247415
1358646.638,412330.7924,35042,5044 FORBES AV,ROBBERY,12/9/95,140100,40.44444479,-79.94136529

The crime data has been written to PGHCrimes.KML. It is viewable in Google Earth Pro.
```

Option 6 Output – KML File Screenshot

```
PGHCrimes.KML x
1 <?xml version="1.0" encoding="UTF-8" ?>
2 <kml xmlns="http://earth.google.com/kml/2.2">
3 <Document>
4 <Style id="style1">
5 <IconStyle>
6 <Icon>
7 <href>http://maps.gstatic.com/intl/en_ALL/mapfiles/ms/micons/blue
8 dot.png</href>
9 </Icon>
10 </IconStyle>
11 </Style>
12 <Placemark>
13 <name>ROBBERY</name>
14 <description>5000 FORBES AV</description>
15 <styleUrl>#style1</styleUrl>
16 <Point>
17 <coordinates>-79.94295871,40.44471042,0.000000</coordinates>
18 </Point>
19 </Placemark>
20 <Placemark>
21 <name>ROBBERY</name>
22 <description>5050 FORBES AV</description>
23 <styleUrl>#style1</styleUrl>
24 <Point>
25 <coordinates>-79.94116573,40.44441059,0.000000</coordinates>
26 </Point>
27 </Placemark>
28 <Placemark>
29 <name>RAPE</name>
30 <description>1045 MOREWOOD AV</description>
31 <styleUrl>#style1</styleUrl>
32 <Point>
33 <coordinates>-79.94213366,40.44600282,0.000000</coordinates>
34 </Point>
35
```


Option 6 Output – Google Earth Pro Outputs



Option 7 Output – Search for nearest neighbour

```
What would you like to do?
1: Print inOrder
2: Print preOrder
3: Print levelOrder
4: Print postOrder
5: Print reverseLevelOrder
6: Search for points within rectangle
7: Search for nearest neighbor
8: Quit

Enter your option: 7

Enter a point to find nearest crime. Separate with a space.
1359951.000 410726.000

Looked at 27 nodes in tree. Found the nearest crime at:
1359951.481,410726.1273,32874,320 SCHENLEY RD,ROBBERY,1/1/90,140100,40.44013011,-79.93653583
```

Option 8 Output – Quit

```
What would you like to do?
1: Print inOrder
2: Print preOrder
3: Print levelOrder
4: Print postOrder
5: Print reverseLevelOrder
6: Search for points within rectangle
7: Search for nearest neighbor
8: Quit

Enter your option: 8

Thank you for exploring Pittsburgh crimes in the 1990's.
```