

RESULTADOS

INSTANCIAS:

5 nodos:

Instancia 1:

numVeh = 2

capacidad = 10

numNodos = 5

costoNodos = [0, 4, 3, 2, 1, 2]

costoAristas = [[50.79, 1892.47, 4739.71, 3560.0, 2891.89, 343.21],
[1968.28, 92.21, 3304.0, 1999.64, 1092.61, 1756.78],
[4947.07, 3426.94, 77.07, 1728.55, 2575.09, 4735.57],
[3593.28, 2042.59, 1722.91, 85.76, 1218.26, 3463.64],
[2778.35, 1086.7, 2536.44, 1247.65, 98.12, 2566.85],
[233.82, 1571.58, 4418.82, 3239.11, 2571.98, 22.24]]

PPL: 11318.53

Clarke and Wright: 11318.53

Clarke and Wright (E): 11744.78

PPL time: 0.1105 s

C and W time: 0.0029 s

Instancia 2:

numVeh = 2

capacidad = 10

numNodos = 5

costoNodos = [0, 4, 2, 1, 1, 3]

costoAristas = [[50.79, 1695.96, 268.96, 2977.53, 4065.87, 1740.73],
[1954.61, 159.52, 1899.33, 4457.08, 5545.42, 3220.28],
[163.16, 1808.33, 35.96, 2755.72, 4007.88, 1682.74],
[2870.23, 4111.4, 2814.95, 91.88, 1727.39, 2738.97],
[4204.29, 5398.99, 4149.01, 1908.72, 135.64, 4026.56],
[1467.58, 3091.4, 1412.3, 2411.62, 3499.96, 266.71]]

PPL: 13627.27

Clarke and Wright: 13627.27

Clarke and Wright (E): 13647.54

PPL time: 0.0306 s

C and W time: 0.0019 s

Instancia 3:

numVeh = 2

capacidad = 10

numNodos = 5

costoNodos = [0, 1, 3, 3, 5, 1]

costoAristas = [[50.79, 4077.1, 1732.0, 268.96, 3435.35, 1340.27],
[4140.65, 155.05, 5455.83, 4085.37, 835.86, 2946.75],
[1626.26, 5229.46, 235.56, 1570.98, 4587.71, 2642.29],
[163.16, 3869.81, 1844.37, 35.96, 3249.0, 1117.48],
[3427.53, 897.14, 4738.27, 3372.25, 34.87, 2374.59],
[1258.29, 3017.74, 2918.15, 1203.01, 2396.93, 64.39]]

PPL: 11854.00

Clarke and Wright: 11862.32

Clarke and Wright (E): 11990.52

PPL time: 0.0259 s

C and W time: 0.0020 s

Instancia 4:

numVeh = 2

capacidad = 10

numNodos = 5

costoNodos = [0, 1, 4, 4, 4, 2]

costoAristas = [[50.79, 1815.21, 3268.04, 3211.81, 955.32, 2632.5],
[1880.46, 96.6, 1691.52, 1681.16, 2763.64, 974.06],
[3315.78, 1854.33, 160.76, 244.78, 3914.61, 957.36],
[3202.39, 1740.94, 359.0, 47.37, 3801.22, 843.97],
[1064.77, 2581.3, 4034.13, 3977.9, 103.73, 3398.59],
[2662.09, 1081.19, 971.62, 961.26, 3353.07, 86.76]]

PPL: 12435.96

Clarke and Wright: 12435.96

Clarke and Wright (E): 12468.37

PPL time: 0.0442

C and W time: 0.0029

Instancia 5:

numVeh = 2

capacidad = 10

numNodos = 5

costoNodos = [0, 1, 1, 2, 2, 4]

costoAristas = [[50.79, 4244.3, 1940.91, 3037.11, 1648.04, 1695.96],
[4258.23, 84.01, 5869.31, 2060.69, 2780.92, 5705.15],
[2208.56, 6015.23, 167.57, 4616.03, 3532.36, 810.83],
[3126.92, 1929.95, 4485.78, 126.41, 1759.12, 4321.62],
[1707.89, 2796.96, 3558.38, 1616.84, 76.86, 3331.71],
[1954.61, 5874.67, 404.47, 4516.66, 3278.41, 159.52]]

PPL: 13135.22

Clarke and Wright: 13437.81

Clarke and Wright (E): 13135.22

PPL time: 0.0214

C and W time: 0.0020

8 Nodos:

Instancia 1:

numVeh = 3

capacidad = 10

numNodos = 8

costoNodos = [0, 5, 5, 1, 1, 1, 2, 4, 4]

costoAristas = [[50.79, 1695.96, 2109.27, 2523.16, 3568.99, 2880.97, 3268.04, 3264.59, 3037.11],
[1954.61, 159.52, 729.19, 4153.53, 5048.54, 4360.52, 4747.59, 4744.14, 4516.66],
[2166.65, 836.01, 140.61, 4265.82, 5078.76, 4390.74, 4777.81, 4774.36, 4546.88],
[2656.25, 4062.56, 4550.95, 149.49, 1496.31, 508.28, 1091.36, 1133.78, 860.43],
[3639.52, 4838.66, 5327.05, 1613.01, 87.46, 1129.64, 1245.89, 1071.06, 1282.93],
[2856.78, 4193.92, 4682.31, 744.53, 1133.57, 87.2, 860.12, 902.54, 629.19],
[3315.78, 4510.48, 4998.87, 1307.23, 1047.28, 832.23, 160.76, 297.56, 679.57],
[3243.53, 4438.23, 4926.62, 1234.98, 975.03, 759.98, 400.14, 52.78, 607.32],
[3126.92, 4321.62, 4810.01, 1114.53, 1108.76, 639.53, 704.03, 529.2, 126.41]]

PPL: 19559.5

Clarke and Wright: 19629.36

Clarke and Wright (E): 20105.45

PPL time: 6.1512

Clarke and Wright time: 0.0030

Instancia 2:

numVeh = 3

capacidad = 10

numNodos = 8

costoNodos = [0, 2, 5, 2, 3, 1, 2, 4, 3]

costoAristas = [[50.79, 1293.91, 2316.19, 2484.01, 3010.69, 1648.04, 2696.63, 1718.61, 557.72],
[785.86, 259.79, 2982.24, 2166.08, 2714.68, 1330.11, 2378.7, 1400.68, 543.35],
[2544.73, 3514.4, 141.39, 4695.98, 4898.54, 3868.53, 4625.25, 3939.1, 2778.21],
[2457.94, 1931.87, 4499.5, 100.67, 934.68, 980.63, 423.63, 953.93, 2215.43],
[2959.35, 2433.28, 4666.72, 798.9, 89.12, 1482.04, 488.92, 1455.34, 2716.84],
[1707.89, 1181.82, 3904.27, 954.42, 1503.02, 76.86, 1149.22, 156.25, 1465.38],
[2785.13, 2259.06, 4539.27, 624.68, 627.51, 1307.82, 104.9, 1281.12, 2542.62],
[1806.52, 1280.45, 4002.9, 877.56, 1426.16, 329.21, 1072.36, 79.39, 1564.01],
[584.48, 1093.56, 2780.86, 2283.66, 2832.26, 1447.69, 2496.28, 1518.26, 113.99]]

PPL: 15567.99

Clarke and Wright: 15567.99

Clarke and Wright (E): 16145.91

PPL time: 8.6980

Clarke and Wright time: 0.0040

Instancia 3:

numVeh = 3

capacidad = 10

numNodos = 8

costoNodos = [0, 3, 1, 4, 4, 5, 5, 2, 5]

costoAristas = [[50.79, 676.07, 1940.91, 3010.69, 3519.04, 529.92, 371.21, 1413.8, 4739.71],
[820.01, 104.0, 1495.02, 3518.42, 4026.77, 392.65, 526.9, 1094.03, 5247.44],
[2208.56, 1632.22, 167.57, 4589.61, 5097.96, 1846.51, 1980.76, 1239.7, 6590.7],
[2959.35, 3324.16, 4320.83, 89.12, 1093.68, 3272.54, 3149.57, 3764.33, 2472.11],
[3541.32, 3903.51, 4900.18, 936.21, 113.79, 3851.89, 3728.92, 4343.68, 1805.16],
[641.74, 377.36, 1642.2, 3324.19, 3832.54, 115.95, 482.1, 1176.51, 5057.21],
[401.78, 676.55, 1862.91, 3133.13, 3641.48, 415.14, 54.62, 1461.92, 4862.15],
[1622.33, 1128.34, 995.16, 3976.14, 4484.49, 1370.88, 1505.13, 93.31, 5977.23],
[4947.07, 5518.24, 6514.91, 2385.09, 1880.78, 5426.2, 5267.49, 5958.41, 77.07]]

PPL: 21798.02

Clarke and Wright: 21798.02

Clarke and Wright (E): 24901.62

PPL time: 20.0218

Clarke and Wright time: 0.0059

Instancia 4:

numVeh = 3

capacidad = 10

numNodos = 8

costoNodos = [0, 3, 4, 3, 4, 2, 2, 4, 3]

costoAristas = [[50.79, 856.42, 1815.21, 443.73, 3400.48, 1236.83, 1695.96, 4244.3, 1740.73],
[980.35, 103.16, 2496.88, 1125.4, 4082.15, 644.46, 1074.45, 4925.97, 2422.4],
[1880.46, 2664.74, 96.6, 1769.48, 1874.05, 3045.15, 3504.28, 2640.71, 2037.23],
[479.26, 1263.54, 1509.64, 122.76, 3201.09, 1643.95, 2103.08, 3938.73, 1671.18],
[3462.4, 3973.71, 2022.46, 3433.28, 34.87, 4331.45, 4657.1, 1150.77, 3284.67],
[1386.52, 628.15, 2877.49, 1506.01, 4383.52, 38.1, 497.23, 5306.58, 2723.77],
[1954.61, 1196.24, 3445.58, 2074.1, 4880.03, 682.39, 159.52, 5874.67, 3220.28],
[4258.23, 5021.76, 2776.72, 4147.25, 1236.09, 5379.5, 5705.15, 84.01, 4332.72],
[1467.58, 2251.86, 1842.28, 1356.6, 2834.57, 2632.27, 3091.4, 3870.4, 266.71]]

PPL: 18178.31

Clarke and Wright: 18178.31

Clarke and Wright (E): 22291.22

PPL time: 2.6540

Clarke and Wright time: 0.0030

Instancia 5:

numVeh = 3

capacidad = 10

numNodos = 8

costoNodos = [0, 1, 2, 2, 5, 3, 4, 2, 4]

costoAristas = [[50.79, 3568.99, 1740.73, 4224.81, 2891.89, 809.93, 4088.91, 2672.65, 349.28],
[3639.52, 87.46, 3466.23, 853.53, 1140.56, 4108.78, 871.04, 1463.52, 3596.5],
[1467.58, 3003.08, 266.71, 3658.9, 2325.98, 2205.37, 3523.0, 2266.97, 1424.56],
[3985.6, 676.88, 3812.31, 147.71, 1486.64, 4454.86, 646.6, 1809.6, 3942.58],
[2778.35, 1322.31, 2650.01, 1927.96, 98.12, 3292.56, 1842.23, 421.08, 2735.33],
[922.53, 4180.54, 2352.28, 4836.36, 3503.44, 90.59, 4700.46, 3284.2, 960.83],
[4188.24, 1282.84, 4010.51, 1056.43, 1828.27, 4653.06, 91.42, 2087.83, 4145.22],
[2506.76, 1645.8, 2663.53, 2293.96, 668.69, 3244.55, 2165.72, 149.49, 2463.74],
[295.56, 3383.41, 1718.0, 3981.56, 2634.12, 1054.7, 3999.07, 2413.9, 84.18]]

PPL: 18284.10

Clarke and Wright: 18318.23

Clarke and Wright (E): 18888.62

PPL time: 6.0548

Clarke and Wright time: 0.0050

10 Nodos:

Instancia 1:

numVeh = 3

capacidad = 12

numNodos = 10

costoNodos = [0, 2, 1, 5, 5, 5, 2, 4, 4, 1, 1]

costoAristas = [[50.79, 557.72, 1815.21, 1458.72, 342.93, 343.21, 3435.35, 1293.91, 2536.6, 4260.58, 428.22],

[584.48, 113.99, 1614.86, 1971.06, 373.1, 372.98, 3271.44, 1093.56, 2336.25, 4154.22, 940.56],

[1880.46, 1637.95, 96.6, 3267.04, 1669.08, 1668.96, 1839.18, 1354.39, 850.76, 2741.61, 2236.54],

[1781.42, 2014.9, 3272.39, 221.89, 1800.11, 1800.39, 4813.29, 2751.09, 3993.78, 5638.52, 1435.73],

[233.54, 281.27, 1494.44, 1641.47, 22.16, 66.76, 3151.02, 973.14, 2215.83, 4124.5, 610.97],

[233.82, 281.23, 1494.32, 1641.75, 66.76, 22.24, 3150.9, 973.02, 2215.71, 4124.38, 611.25],

[3427.53, 3266.88, 1987.59, 4518.47, 3298.01, 3297.89, 34.87, 3042.42, 1490.26, 1537.38, 3608.32],

[785.86, 543.35, 1497.28, 2172.44, 574.48, 574.36, 3153.86, 259.79, 2218.67, 4127.34, 1141.94],

[2331.14, 2088.63, 756.34, 3717.72, 2119.76, 2119.64, 1602.98, 1805.07, 153.26, 2428.21, 2687.22],

[4329.32, 4168.67, 2889.38, 5420.26, 4199.8, 4199.68, 1613.94, 3944.21, 2478.32, 12.13, 4510.11],

[632.4, 865.88, 2123.37, 1215.46, 651.09, 651.37, 3743.51, 1602.07, 2844.76, 4568.74, 90.96]]

PPL: 14908.05

Clarke and Wright: 14917.12

Clarke and Wright (E): 15947.01

PPL time: 4.9141

C and W time: 0.0059

Instancia 2:

numVeh = 3

capacidad = 12

numNodos = 10

costoNodos = [0, 3, 3, 5, 4, 4, 1, 2, 2, 4]

costoAristas = [[50.79, 1740.73, 2801.53, 428.22, 735.21, 2672.65, 1940.91, 2631.38, 2073.48, 566.49, 2129.85],

[1467.58, 266.71, 2237.56, 1823.66, 2152.0, 2266.97, 3318.07, 3979.15, 1952.87, 1233.84, 3477.62],

[2680.23, 2594.65, 104.9, 2953.17, 3274.99, 322.96, 4131.24, 4728.58, 802.77, 2446.49, 4290.79],

[632.4, 2048.89, 3109.69, 90.96, 426.03, 2980.81, 1668.51, 2471.24, 2381.64, 874.65, 1969.71],

[863.49, 2223.0, 3285.74, 517.8, 90.82, 3211.9, 1367.33, 2170.06, 2612.73, 1105.74, 1668.53],

[2506.76, 2663.53, 577.35, 2862.84, 3191.18, 149.49, 4202.43, 4799.77, 629.3, 2273.02, 4361.98],

[2208.56, 3319.65, 4382.39, 1862.87, 1590.96, 4411.8, 167.57, 974.69, 3957.8, 2450.81, 473.16],

[2572.57, 3656.42, 4719.16, 2281.83, 2090.61, 4748.57, 1003.31, 138.19, 4321.81, 2814.82, 647.94],

[1978.29, 2135.06, 997.88, 2334.37, 2662.71, 869.0, 3828.78, 4489.86, 88.99, 1744.55, 3988.33],

[356.5, 1778.62, 2603.4, 712.58, 1040.92, 2474.52, 2206.99, 2868.07, 1875.35, 122.76, 2366.54],

[2349.19, 3433.04, 4495.78, 2058.45, 1867.23, 4525.19, 779.93, 643.05, 4098.43, 2591.44, 141.52]]

PPL: 14359.53

Clarke and Wright: 14359.53

Clarke and Wright (E): 15196.02

PPL time: 6.4091

C and W time: 0.0044

Instancia 3:

numVeh = 3

capacidad = 12

numNodos = 10

costoNodos = [0, 3, 5, 4, 5, 1, 4, 1, 1, 4, 2]

costoAristas = [[50.79, 3264.59, 371.21, 1979.89, 898.88, 1984.68, 2696.63, 2484.01, 1337.01, 1374.24, 2536.6],

[3243.53, 52.78, 3431.13, 4641.37, 3892.27, 1577.15, 980.7, 1126.41, 4212.76, 2196.95, 1179.0],

[401.78, 3387.03, 54.62, 1901.89, 784.1, 2107.12, 2819.07, 2606.45, 1288.15, 1496.68, 2659.04],

[2068.23, 4675.94, 1888.79, 38.98, 1355.7, 3728.67, 4148.75, 4219.48, 944.55, 3118.23, 4272.07],

[1024.72, 3908.09, 825.17, 1265.46, 101.01, 2685.16, 3380.9, 3184.49, 622.58, 2074.72, 3237.08],

[1876.07, 1729.55, 2196.49, 3765.54, 2724.16, 92.21, 988.58, 793.78, 3140.94, 716.14, 846.37],

[2785.13, 927.28, 3022.12, 4232.36, 3483.26, 1001.27, 104.9, 624.68, 3803.75, 1625.2, 677.27],

[2457.94, 1234.45, 2778.36, 4192.59, 3306.03, 674.08, 423.63, 100.67, 3722.81, 1298.01, 354.83],

[1310.32, 4171.43, 1100.88, 1057.72, 567.79, 2970.76, 3644.24, 3470.09, 138.28, 2360.32, 3522.68],

[1455.01, 2162.91, 1775.43, 3344.48, 2303.1, 709.99, 1421.94, 1227.14, 2719.88, 98.36, 1279.73],

[2331.14, 1416.02, 2651.56, 4220.61, 3179.23, 551.41, 670.13, 548.74, 3596.01, 1171.21, 153.26]]

PPL: 15183.51

Clarke and Wright: 15183.51

Clarke and Wright (E): 15183.51

PPL time: 182.7404

Clarke and Wright time: 0.0040

Instancia 4:

numVeh = 3

capacidad = 12

numNodos = 10

costoNodos = [0, 3, 4, 3, 1, 2, 2, 1, 2, 1, 3]

costoAristas = [[50.79, 4471.33, 2174.8, 2631.38, 4304.83, 634.82, 4009.68, 2194.75, 1695.96, 2278.81, 1374.24],

[4690.53, 166.5, 6506.11, 6898.95, 331.16, 5253.21, 969.07, 2917.74, 6137.45, 2821.87, 3530.6],

[2297.57, 6327.16, 44.95, 501.53, 6160.66, 1838.48, 5834.95, 4168.08, 966.93, 4252.14, 3347.57],

[2572.57, 6602.16, 409.85, 138.19, 6435.66, 2113.48, 6109.95, 4443.08, 1241.93, 4527.14, 3622.57],

[4855.19, 331.16, 6670.77, 7063.61, 164.66, 5417.87, 1133.73, 3082.4, 6302.11, 2986.53, 3695.26],

[773.38, 4932.43, 1910.22, 2366.8, 4765.93, 115.21, 4470.78, 2655.85, 1319.12, 2739.91, 1835.34],

[4161.18, 736.07, 5976.76, 6369.6, 569.57, 4723.86, 39.86, 2388.39, 5608.1, 2292.52, 3001.25],

[2082.66, 2687.39, 4137.65, 4594.23, 2520.89, 2645.34, 2195.18, 95.87, 3706.48, 380.72, 922.73],

[1954.61, 6101.7, 750.62, 1207.2, 5935.2, 1439.08, 5640.05, 3825.12, 159.52, 3909.18, 3004.61],

[2177.88, 2782.61, 4232.87, 4655.36, 2616.11, 2740.56, 2290.4, 191.09, 3801.7, 95.22, 1017.95],

[1455.01, 3311.78, 3510.0, 3966.58, 3145.28, 2017.69, 2827.63, 920.06, 3078.83, 1013.17, 98.36]]

PPL: 15976.88

Clarke and Wright: 15976.88

Clarke and Wright (E): 16420.79

PPL time: 0.3500

Clarke and Wright time: 0.0059

Instancia 5:

numVeh = 3

capacidad = 12

numNodos = 10

costoNodos = [0, 5, 4, 3, 5, 5, 1, 2, 1, 2, 3]

costoAristas = [[50.79, 898.88, 2591.73, 4260.58, 4180.33, 288.01, 3268.04, 794.49, 2891.89, 1732.0, 4629.35],

[1024.72, 101.01, 3292.21, 4904.08, 4823.83, 943.78, 3911.54, 378.29, 3535.39, 1017.57, 5329.83],

[2643.9, 3384.79, 68.57, 2056.09, 1975.84, 2881.12, 953.43, 3291.46, 369.71, 4046.79, 2493.1],

[4329.32, 4978.06, 2147.99, 12.13, 1568.43, 4566.54, 1931.25, 4884.73, 1969.35, 5640.06, 2192.07],

[4096.82, 4745.56, 1915.49, 1436.37, 91.42, 4334.04, 1698.75, 4652.23, 1736.85, 5407.56, 1734.89],

[392.06, 966.7, 2659.55, 4328.4, 4248.15, 118.61, 3335.86, 862.31, 2959.71, 1799.82, 4697.17],

[3315.78, 3964.52, 1076.82, 1738.87, 1658.62, 3553.0, 160.76, 3871.19, 843.15, 4626.52, 2379.71],

[918.2, 365.1, 3185.69, 4797.56, 4717.31, 837.26, 3805.02, 90.59, 3428.87, 1103.25, 5223.31],

[2778.35, 3476.48, 340.16, 2013.9, 1933.65, 3015.57, 878.08, 3383.15, 98.12, 4138.48, 2426.08],

[1626.26, 883.73, 3893.75, 5412.94, 5332.69, 1535.43, 4420.4, 967.28, 4044.25, 235.56, 5931.37],

[5072.86, 5740.58, 2910.51, 1862.08, 2073.06, 5310.08, 2693.77, 5647.25, 2700.88, 6402.58, 43.78]]

PPL: 22750.50

Clarke and Wright: 22750.50

Clarke and Wright (E): 25202.30

PPL time: 542.2112

Clarke and Wright time: 0.0049

12 Nodos:

Instancia 1:

numVeh = 3

capacidad = 15

numNodos = 12

costoNodos = [0, 4, 1, 4, 4, 2, 4, 5, 3, 4, 2, 3, 4]

costoAristas = [[50.79, 1740.73, 1153.25, 586.55, 691.8, 3278.66, 3514.27, 1413.8, 1060.45, 809.93, 4166.49, 557.72, 1576.44],
[1467.58, 266.71, 384.49, 2003.34, 2108.59, 2712.75, 2948.36, 2761.57, 2455.89, 2205.37, 3600.58, 1225.07, 2971.88],
[1200.87, 941.28, 117.78, 1736.63, 1841.88, 2446.04, 2681.65, 2494.86, 2189.18, 1938.66, 3333.87, 958.36, 2705.17],
[658.17, 2086.62, 1499.14, 57.72, 278.41, 3624.55, 3860.16, 1163.31, 717.87, 467.35, 4512.38, 903.61, 1199.83],
[785.47, 2173.35, 1614.48, 324.69, 105.13, 3711.28, 3946.89, 1038.95, 593.51, 342.99, 4599.11, 1018.95, 1109.5],
[3377.27, 3288.92, 2710.54, 3833.85, 3933.97, 150.87, 1071.06, 4269.01, 4159.32, 3931.47, 1795.65, 3134.76, 4541.83],
[3546.09, 3368.36, 3003.3, 3913.29, 4013.41, 987.26, 113.79, 4348.45, 4238.76, 4010.91, 1099.15, 3385.44, 4621.27],
[1622.33, 2706.18, 2451.34, 1197.79, 1187.36, 4244.11, 4479.72, 93.31, 823.43, 967.66, 5131.94, 1855.81, 711.48],
[1295.86, 2633.11, 2124.87, 779.08, 768.65, 4171.04, 4406.65, 860.05, 123.82, 558.84, 5058.87, 1529.34, 639.81],
[922.53, 2352.28, 1764.8, 323.38, 312.95, 3890.21, 4125.82, 967.73, 522.29, 90.59, 4778.04, 1169.27, 999.91],
[4089.9, 3912.17, 3564.13, 4457.1, 4557.22, 1531.07, 1267.35, 4892.26, 4782.57, 4554.72, 84.5, 3929.25, 5165.08],
[584.48, 1634.37, 952.9, 1120.24, 1225.49, 3172.3, 3350.36, 1878.47, 1572.79, 1322.27, 4060.13, 113.99, 2088.78],
[1637.25, 2933.09, 2466.26, 1102.11, 1091.68, 4471.02, 4706.63, 853.14, 716.17, 900.23, 5358.85, 1870.73, 40.0]]

PPL: 17785.97

Clarke and Wright: 17875.37

Clarke and Wright (E): 18542.74

PPL time: 1670.6867

C and W time: 0.0070

Instancia 2:

numVeh = 3

capacidad = 15

numNodos = 12

costoNodos = [0, 1, 5, 3, 4, 3, 3, 4, 5, 3, 3, 1]

costoAristas = [[50.79, 566.49, 1470.75, 1718.61, 1337.01, 288.01, 2910.7, 794.49, 349.28, 2316.19, 1740.73, 1458.72, 2203.79],
[356.5, 122.76, 1272.62, 1520.48, 1621.37, 593.72, 2839.71, 1100.2, 313.48, 2552.88, 1778.62, 1743.08, 2005.66],
[1549.67, 1315.93, 96.51, 353.77, 2814.54, 1786.89, 1664.79, 2293.37, 1506.65, 3746.05, 1706.44, 2936.25, 830.74],
[1806.52, 1572.78, 546.38, 79.39, 3071.39, 2043.74, 1413.57, 2550.22, 1763.5, 4002.9, 1963.29, 3193.1, 579.52],
[1310.32, 1552.57, 2456.83, 2704.69, 138.28, 1219.49, 3817.54, 651.34, 1335.36, 1506.28, 2647.57, 536.55, 3189.87],
[392.06, 634.31, 1538.57, 1786.43, 1404.83, 118.61, 2978.52, 862.31, 417.1, 2384.01, 1808.55, 1526.54, 2271.61],
[2954.7, 2720.96, 1694.56, 1456.79, 4020.8, 3191.92, 78.73, 3606.98, 2911.68, 4756.32, 2873.84, 4142.51, 976.95],
[918.2, 1160.45, 2064.71, 2312.57, 708.26, 837.26, 3447.68, 90.59, 943.24, 1799.7, 2277.71, 829.97, 2797.75],
[295.56, 352.06, 1212.0, 1459.86, 1581.78, 532.78, 2779.09, 1039.26, 84.18, 2536.26, 1718.0, 1703.49, 1945.04],
[2544.73, 2786.98, 3691.24, 3939.1, 1506.16, 2558.65, 4798.55, 2003.03, 2569.77, 141.39, 3628.58, 1551.67, 4424.28],
[1467.58, 1233.84, 1747.24, 1745.68, 2732.45, 1704.8, 2344.79, 2211.28, 1424.56, 3663.96, 266.71, 2854.16, 2054.31],
[1781.42, 2023.67, 2927.93, 3175.79, 609.38, 1672.23, 4288.64, 1104.08, 1806.46, 1191.62, 3118.67, 221.89, 3660.97],
[2083.2, 1849.46, 823.06, 584.75, 3348.07, 2320.42, 1165.15, 2826.9, 2040.18, 4279.58, 2239.97, 3469.78, 104.91]]

PPL: 14734.90

Clarke and Wright: 14914.22

Clarke and Wright (E): 15338.19

PPL time: 151.5116

Clarke and Wright time: 0.0090

Instancia 3:

numVeh = 3

capacidad = 15

numNodos = 12

costoNodos = [0, 3, 2, 2, 4, 2, 4, 1, 2, 3, 5, 1, 5]

costoAristas = [[50.79, 365.09, 4471.33, 1374.24, 371.21, 4224.81, 634.82, 316.59, 349.28, 1493.54, 1716.08, 2678.49, 571.56],
[255.7, 22.16, 4172.72, 1075.63, 576.12, 3941.7, 818.38, 521.5, 212.68, 1194.93, 1417.47, 2379.88, 755.12],
[4690.53, 4501.31, 166.5, 3530.6, 5010.95, 1581.8, 5253.21, 4956.33, 4647.51, 3649.9, 3290.08, 2510.21, 5189.95],
[1455.01, 1265.79, 3311.78, 98.36, 1775.43, 3036.67, 2017.69, 1720.81, 1411.99, 414.38, 449.6, 1403.8, 1954.43],
[401.78, 487.53, 4593.77, 1496.68, 54.62, 4347.25, 635.3, 201.81, 471.72, 1615.98, 1838.52, 2800.93, 572.04],
[3985.6, 3796.38, 1005.4, 2825.67, 4177.64, 147.71, 4374.66, 4123.02, 3942.58, 2944.97, 2572.18, 1678.3, 4311.4],
[773.38, 826.19, 4932.43, 1835.34, 480.27, 4685.91, 115.21, 425.65, 810.38, 1954.64, 2177.18, 3139.59, 402.97],
[450.88, 536.63, 4642.87, 1545.78, 103.72, 4396.35, 684.4, 49.1, 520.82, 1665.08, 1887.62, 2850.03, 621.14],
[295.56, 106.34, 4212.58, 1115.49, 615.98, 3981.56, 879.59, 561.36, 84.18, 1234.79, 1457.33, 2419.74, 816.33],
[1193.9, 1004.68, 3715.18, 596.4, 1514.32, 3484.16, 1756.58, 1459.7, 1150.88, 153.27, 938.24, 1900.65, 1693.32],
[1631.03, 1441.81, 3092.76, 471.1, 1951.45, 2817.65, 2193.71, 1896.83, 1588.01, 590.4, 76.86, 1184.78, 2130.45],
[2661.32, 2472.1, 2353.29, 1501.39, 2855.08, 1951.75, 3052.1, 2800.46, 2618.3, 1620.69, 1154.78, 86.76, 2988.84],
[715.47, 768.28, 4874.52, 1777.43, 422.36, 4628.0, 403.16, 367.74, 752.47, 1896.73, 2119.27, 3081.68, 115.02]]

PPL: 13426.76

Clarke and Wright: 13426.76

Clarke and Wright (E): 14003.87

PPL time: 15.5383

Clarke and Wright time: 0.0069

Instancia 4:

numVeh = 3

capacidad = 15

numNodos = 12

costoNodos = [0, 4, 5, 1, 5, 5, 1, 1, 1, 4, 2, 2, 3]

costoAristas = [[50.79, 1984.68, 586.13, 4304.83, 936.63, 316.59, 1815.21, 1695.96, 3842.97, 2203.79, 1455.28, 233.0, 3010.69],
[1876.07, 92.21, 2411.41, 2719.98, 2740.56, 2141.87, 394.56, 3499.89, 2205.97, 495.74, 3211.54, 1879.18, 1342.38],
[682.69, 2343.13, 115.02, 4663.28, 595.11, 468.43, 2173.66, 1354.44, 4201.42, 2562.24, 1176.67, 591.45, 3364.34],
[4855.19, 3289.46, 5390.53, 164.66, 5687.55, 5120.99, 3373.68, 6302.11, 1349.12, 3091.44, 5951.25, 4858.3, 2293.21],
[1129.94, 2790.38, 738.07, 5110.53, 85.04, 875.77, 2620.91, 844.37, 4624.64, 3009.49, 735.61, 1038.7, 3737.15],
[450.88, 2156.22, 520.45, 4476.37, 941.76, 49.1, 1986.75, 1667.06, 4014.51, 2375.33, 1552.5, 404.54, 3182.23],
[1880.46, 281.02, 2415.8, 2724.37, 2744.95, 2146.26, 96.6, 3504.28, 2210.36, 500.13, 3215.93, 1883.57, 1346.77],
[1954.61, 3615.05, 1534.49, 5935.2, 1079.79, 1672.19, 3445.58, 159.52, 5377.73, 3834.16, 1181.81, 1863.37, 4490.24],
[3926.55, 2283.65, 4293.33, 872.25, 4506.69, 4059.53, 2486.61, 5121.25, 28.71, 2109.61, 4770.39, 3871.81, 1329.99],
[2083.2, 302.93, 2618.54, 2726.43, 2947.69, 2349.0, 507.86, 3707.02, 2211.05, 104.91, 3418.67, 2086.31, 1265.14],
[1529.02, 3189.46, 1219.5, 5392.11, 736.55, 1357.2, 3019.99, 737.69, 4770.32, 3408.57, 41.48, 1437.78, 3882.83],
[165.68, 1835.73, 701.02, 4155.88, 1051.52, 431.48, 1666.26, 1810.85, 3694.02, 2054.84, 1570.17, 74.44, 2883.66],
[2959.35, 1175.49, 3328.75, 1980.3, 3542.11, 3094.95, 1378.45, 4156.67, 1466.29, 992.9, 3805.81, 2907.23, 89.12]]

PPL: 15813.99

Clarke and Wright: 15813.99

Clarke and Wright (E): 16760.37

PPL time: 50.7040

Clarke and Wright time: 0.0050

Instancia 5:

numVeh = 3

capacidad = 15

numNodos = 12

costoNodos = [0, 5, 2, 4, 5, 3, 3, 2, 2, 5, 1, 1, 5]

costoAristas = [[50.79, 2484.01, 2129.85, 1274.93, 169.4, 644.04, 484.98, 4304.83, 4629.35, 316.59, 2109.27, 1732.0, 2891.89],
[2457.94, 100.67, 4313.16, 3660.73, 2576.55, 3051.19, 2892.13, 2361.81, 2743.26, 2723.74, 4477.84, 4105.49, 619.87],
[2349.19, 4500.44, 141.52, 1172.34, 2467.8, 2005.31, 2092.97, 6212.28, 6593.73, 2189.88, 586.98, 1123.14, 4584.2],
[1348.42, 3508.19, 1081.48, 38.1, 1376.2, 889.13, 987.45, 5329.01, 5653.53, 1084.36, 948.64, 571.37, 3836.83],
[465.77, 2670.44, 2228.1, 1290.06, 118.61, 593.25, 434.19, 4491.26, 4815.78, 265.8, 2093.55, 1717.99, 3078.32],
[745.95, 2905.72, 1788.36, 870.53, 823.53, 115.21, 434.78, 4726.54, 5051.06, 531.69, 1704.87, 1327.6, 3308.8],
[550.26, 2732.08, 2045.65, 1107.61, 470.81, 410.8, 82.06, 4552.9, 4877.42, 178.97, 1911.1, 1535.54, 3139.96],
[4855.19, 2838.72, 6625.82, 6014.56, 4973.8, 5448.44, 5289.38, 164.66, 877.27, 5120.99, 6790.5, 6418.15, 2483.21],
[5072.86, 3056.39, 6610.25, 5998.99, 5191.47, 5516.53, 5357.47, 736.25, 43.78, 5224.82, 6774.93, 6402.58, 2700.88],
[450.88, 2655.55, 2213.21, 1275.17, 340.94, 578.36, 419.3, 4476.37, 4800.89, 49.1, 2078.66, 1703.1, 3063.43],
[2166.65, 4317.9, 321.61, 989.8, 2285.26, 1822.77, 1910.43, 6029.74, 6411.19, 2007.34, 140.61, 940.6, 4401.66],
[1626.26, 3786.03, 1208.83, 315.94, 1654.04, 1166.97, 1265.29, 5606.85, 5931.37, 1362.2, 1150.28, 235.56, 4044.25],
[2778.35, 617.9, 4346.15, 3734.89, 2896.96, 3252.43, 3093.37, 2044.63, 2426.08, 2960.72, 4510.83, 4138.48, 98.12]]

PPL: 17458.04

Clarke and Wright: 17458.04

Clarke and Wright (E): 18202.97

PPL time: 18.7892

Clarke and Wright time: 0.0059

EUCLIDIANOS

5 Nodos:

Instancia 1:

numVeh = 2

capacidad = 10

numNodos = 5

costoNodos = [0, 2, 5, 4, 1, 3]

costoAristas = [[0, 17.72, 23.3452, 30.4138, 38.0132, 42.5206],

[17.72, 0, 22.2036, 41.3401, 55.3263, 36.2491],

[23.3452, 22.2036, 0, 53.7587, 48.3735, 58.1808],

[30.4138, 41.3401, 53.7587, 0, 43.9318, 37.054],

[38.0132, 55.3263, 48.3735, 43.9318, 0, 75.0267],

[42.5206, 36.2491, 58.1808, 37.054, 75.0267, 0]]

Instancia 2:

numVeh = 2

capacidad = 10

numNodos = 5

costoNodos = [0, 1, 3, 5, 4, 3]

costoAristas = [[0, 14.8661, 27.2029, 27.4591, 28.0179, 36.1248],
[14.8661, 0, 34.4819, 42.0595, 26.4197, 50.636],
[27.2029, 34.4819, 0, 37.6563, 18.0278, 32.0156],
[27.4591, 42.0595, 37.6563, 0, 49.2443, 17.6918],
[28.0179, 26.4197, 18.0278, 49.2443, 0, 48.2701],
[36.1248, 50.636, 32.0156, 17.6918, 48.2701, 0]]

Instancia 3:

numVeh = 2

capacidad = 10

numNodos = 5

costoNodos = [0, 5, 1, 4, 4, 1]

costoAristas = [[0, 27.2029, 34.7131, 48.8774, 40.4969, 50.9117],

[27.2029, 0, 23.4307, 26.1725, 13.4164, 24.4131],

[34.7131, 23.4307, 0, 19.6977, 29.5466, 29.0689],

[48.8774, 26.1725, 19.6977, 0, 21.9317, 12.53],

[40.4969, 13.4164, 29.5466, 21.9317, 0, 14.1421],

[50.9117, 24.4131, 29.0689, 12.53, 14.1421, 0]]

Instancia 4:

numVeh = 2

capacidad = 10

numNodos = 5

costoNodos = [0, 1, 5, 2, 5, 4]

costoAristas = [[0, 26.9258, 30.2655, 25.1794, 38.2753, 35.3553],
[26.9258, 0, 31.8277, 51.9711, 53.2353, 60.208],
[30.2655, 31.8277, 0, 43.9318, 25.0799, 62.1772],
[25.1794, 51.9711, 43.9318, 0, 35.2278, 22],
[38.2753, 53.2353, 25.0799, 35.2278, 0, 57.1402],
[35.3553, 60.208, 62.1772, 22, 57.1402, 0]]

Instancia 5:

numVeh = 2

capacidad = 10

numNodos = 5

costoNodos = [0, 4, 4, 2, 2, 4]

costoAristas = [[0, 20.5183, 26.4197, 39.9249, 34.6554, 32.6956],
[20.5183, 0, 46.6154, 22.0227, 55.1543, 16.1245],
[26.4197, 46.6154, 0, 66.2118, 12.0416, 56.0803],
[39.9249, 22.0227, 66.2118, 0, 72.9452, 28.3019],
[34.6554, 55.1543, 12.0416, 72.9452, 0, 66.2873],
[32.6956, 16.1245, 56.0803, 28.3019, 66.2873, 0]]

8 Nodos:

Instancia 1:

numVeh = 3

capacidad = 10

numNodos = 8

costoNodos = [0, 5, 3, 1, 4, 1, 3, 5, 5]

costoAristas = [[0, 30.2324, 26.2488, 33.3017, 22.1359, 24, 29, 33, 25],
[30.2324, 0, 18.7883, 47.676, 51.8845, 48.0208, 37.2156, 18.7883, 32.7567],
[26.2488, 18.7883, 0, 30, 43.1856, 49.6488, 46.8402, 35.3553, 15.0333],
[33.3017, 47.676, 30, 0, 32.0156, 53.7122, 62.2415, 60.4152, 15.0333],
[22.1359, 51.8845, 43.1856, 32.0156, 0, 27.0185, 43.9659, 54.4518, 34.0147],
[24, 48.0208, 49.6488, 53.7122, 27.0185, 0, 21.3776, 40.8044, 48.5077],
[29, 37.2156, 46.8402, 62.2415, 43.9659, 21.3776, 0, 23.3238, 52.1536],
[33, 18.7883, 35.3553, 60.4152, 54.4518, 40.8044, 23.3238, 0, 46.6476],
[25, 32.7567, 15.0333, 15.0333, 34.0147, 48.5077, 52.1536, 46.6476, 0]]

Instancia 2:

numVeh = 3

capacidad = 10

numNodos = 8

costoNodos = [0, 5, 5, 1, 2, 2, 4, 5, 1]

costoAristas = [[0, 31.0644, 27.0185, 25, 16.7631, 46.4004, 19.4165, 32.0624, 38.9487],
[31.0644, 0, 16.0312, 38.6005, 21.0238, 15.5563, 50.4777, 61.0328, 69.814],
[27.0185, 16.0312, 0, 24.1868, 26.6271, 28.7924, 44.643, 59.0762, 62.1691],
[25, 38.6005, 24.1868, 0, 37.3631, 52.8015, 32.28, 50.3289, 44.4072],
[16.7631, 21.0238, 26.6271, 37.3631, 0, 34.176, 34.2053, 41.1461, 54.037],
[46.4004, 15.5563, 28.7924, 52.8015, 34.176, 0, 65.8027, 75.2396, 85.276],
[19.4165, 50.4777, 44.643, 32.28, 34.2053, 65.8027, 0, 18.3576, 19.8494],
[32.0624, 61.0328, 59.0762, 50.3289, 41.1461, 75.2396, 18.3576, 0, 24.1868],
[38.9487, 69.814, 62.1691, 44.4072, 54.037, 85.276, 19.8494, 24.1868, 0]]

Instancia 3:

numVeh = 3

capacidad = 10

numNodos = 8

costoNodos = [0, 5, 3, 3, 2, 2, 1, 3, 3]

costoAristas = [[0, 17.1172, 14.8661, 19.2094, 22.4722, 23.0868, 42.4853, 33.2415, 35],
[17.1172, 0, 14.7648, 33.6155, 38.4708, 28.3196, 40.05, 18.6011, 52.0384],
[14.8661, 14.7648, 0, 22.3607, 36.3593, 36.0555, 28.4605, 22.0907, 46.3249],
[19.2094, 33.6155, 22.3607, 0, 24.6982, 39.2938, 38.6005, 44.4072, 27.4591],
[22.4722, 38.4708, 36.3593, 24.6982, 0, 24.2074, 60.959, 55.6597, 16.1245],
[23.0868, 28.3196, 36.0555, 39.2938, 24.2074, 0, 64.5136, 46.6905, 40.2244],
[42.4853, 40.05, 28.4605, 38.6005, 60.959, 64.5136, 0, 31.7805, 66.0303],
[33.2415, 18.6011, 22.0907, 44.4072, 55.6597, 46.6905, 31.7805, 0, 67.6018],
[35, 52.0384, 46.3249, 27.4591, 16.1245, 40.2244, 66.0303, 67.6018, 0]]

Instancia 4:

numVeh = 3

capacidad = 10

numNodos = 8

costoNodos = [0, 5, 3, 5, 1, 2, 3, 3, 5]

costoAristas = [[0, 18.6815, 15.1327, 16.5529, 37.1214, 36.6742, 36.6742, 38.8973, 46.2709],
[18.6815, 0, 22.3607, 33.0606, 52.3927, 44.0454, 32.8938, 24.1661, 47.0106],
[15.1327, 22.3607, 0, 15.2643, 31.0644, 22.8035, 22.8473, 32.311, 31.1448],
[16.5529, 33.0606, 15.2643, 0, 20.5913, 26.0192, 36.4006, 47.4236, 40.2616],
[37.1214, 52.3927, 31.0644, 20.5913, 0, 23.3452, 44.2832, 61.8142, 40.3113],
[36.6742, 44.0454, 22.8035, 26.0192, 23.3452, 0, 23.1948, 44.4072, 17.0294],
[36.6742, 32.8938, 22.8473, 36.4006, 44.2832, 23.1948, 0, 22.8473, 15.6205],
[38.8973, 24.1661, 32.311, 47.4236, 61.8142, 44.4072, 22.8473, 0, 38.0789],
[46.2709, 47.0106, 31.1448, 40.2616, 40.3113, 17.0294, 15.6205, 38.0789, 0]]

Instancia 5:

numVeh = 3

capacidad = 10

numNodos = 8

costoNodos = [0, 5, 4, 4, 5, 5, 1, 1]

costoAristas = [[0, 9.21954, 23.8537, 22.4722, 44.0454, 35.0143, 35.171, 55.8659, 53.0377],
[9.21954, 0, 33.0151, 28.0713, 43.4166, 28.8617, 40.05, 46.669, 54.6443],
[23.8537, 33.0151, 0, 21.0238, 56.0446, 56.2939, 35.805, 79.3977, 53.1413],
[22.4722, 28.0713, 21.0238, 0, 65.7343, 56.7186, 51.614, 68.4251, 33.6155],
[44.0454, 43.4166, 56.0446, 65.7343, 0, 27.0185, 25.7099, 67.2681, 97],
[35.0143, 28.8617, 56.2939, 56.7186, 27.0185, 0, 42.0119, 40.3113, 82.2982],
[35.171, 40.05, 35.805, 51.614, 25.7099, 42.0119, 0, 79.3095, 85.1469],
[55.8659, 46.669, 79.3977, 68.4251, 67.2681, 40.3113, 79.3095, 0, 78.0256],
[53.0377, 54.6443, 53.1413, 33.6155, 97, 82.2982, 85.1469, 78.0256, 0]]

10 Nodos:

Instancia 1:

numVeh = 3

capacidad = 12

numNodos = 10

costoNodos = [0, 2, 4, 4, 1, 2, 3, 5, 2, 1, 4]

costoAristas = [[0, 11.1803, 21.9545, 19.799, 17.4642, 16.4924, 17.4929, 22.2036, 25.4951, 29.2746, 31.3847],
[11.1803, 0, 14.0357, 25.632, 28.4605, 25.2389, 20.025, 14.4222, 14.3178, 27.7849, 39.6232],
[21.9545, 14.0357, 0, 25.4951, 36.2353, 38.0789, 34.0588, 24.5967, 14.4222, 18.0278, 40.6079],
[19.799, 25.632, 25.4951, 0, 18.2483, 31.6228, 37.0135, 39.8121, 37.1214, 18.0278, 15.1327],
[17.4642, 28.4605, 36.2353, 18.2483, 0, 17.6918, 28.2312, 39.0128, 42.72, 35.4683, 20],
[16.4924, 25.2389, 38.0789, 31.6228, 17.6918, 0, 13.0384, 29.0689, 38.1838, 45, 37.5366],
[17.4929, 20.025, 34.0588, 37.0135, 28.2312, 13.0384, 0, 17.6918, 29.5296, 45.8803, 46.6154],
[22.2036, 14.4222, 24.5967, 39.8121, 39.0128, 29.0689, 17.6918, 0, 14.0357, 41.2311, 53.1601],
[25.4951, 14.3178, 14.4222, 37.1214, 42.72, 38.1838, 29.5296, 14.0357, 0, 32.45, 52.0096],
[29.2746, 27.7849, 18.0278, 18.0278, 35.4683, 45, 45.8803, 41.2311, 32.45, 0, 30.2324],
[31.3847, 39.6232, 40.6079, 15.1327, 20, 37.5366, 46.6154, 53.1601, 52.0096, 30.2324, 0]]

Instancia 2:

numVeh = 3

capacidad = 12

numNodos = 10

costoNodos = [0, 5, 2, 3, 2, 1, 4, 5, 5, 4, 1]

costoAristas = [[0, 12.8062, 21.2603, 24.1868, 23.7697, 23.0868, 40.3113, 37.0135, 31.0161, 34.9285, 32.573],
[12.8062, 0, 22.8035, 36.4006, 32.0156, 22.0227, 27.5862, 27.8927, 37.0135, 47.4131, 23],
[21.2603, 22.8035, 0, 28.8617, 44.4185, 42.72, 43.9659, 25.807, 15.8114, 48, 45.3982],
[24.1868, 36.4006, 28.8617, 0, 31.6228, 43.2897, 63.8905, 53.7122, 24.3516, 21.1896, 56.4624],
[23.7697, 32.0156, 44.4185, 31.6228, 0, 19.8494, 54.4243, 59.5399, 50.3289, 25.0799, 38.833],
[23.0868, 22.0227, 42.72, 43.2897, 19.8494, 0, 36.4966, 48.7545, 54.0833, 43.8292, 19.2354],
[40.3113, 27.5862, 43.9659, 63.8905, 54.4243, 36.4966, 0, 28.1603, 59.7746, 74.0608, 19.2354],
[37.0135, 27.8927, 25.807, 53.7122, 59.5399, 48.7545, 28.1603, 0, 39.6989, 70.6116, 40.3609],
[31.0161, 37.0135, 15.8114, 24.3516, 50.3289, 54.0833, 59.7746, 39.6989, 0, 45.5412, 60.0083],
[34.9285, 47.4131, 48, 21.1896, 25.0799, 43.8292, 74.0608, 70.6116, 45.5412, 0, 61.5549],
[32.573, 23, 45.3982, 56.4624, 38.833, 19.2354, 19.2354, 40.3609, 60.0083, 61.5549, 0]]

Instancia 3:

numVeh = 3

capacidad = 12

numNodos = 10

costoNodos = [0, 2, 5, 3, 1, 1, 5, 5, 1, 5, 4]

costoAristas = [[0, 19.799, 19.0263, 18.3576, 20.8806, 29.6816, 27.0185, 43.0813, 38.0789, 52.8394, 45.607],
[19.799, 0, 15.8114, 30.4138, 20.8806, 49.2037, 43.6578, 54.037, 32.5269, 61.1882, 26.0768],
[19.0263, 15.8114, 0, 36.4006, 32.6497, 46.4866, 32.8024, 39.1152, 19.6977, 70.3847, 38.0789],
[18.3576, 30.4138, 36.4006, 0, 14.8661, 26.5707, 39, 58.5235, 55.9732, 34.4819, 51.6236],
[20.8806, 20.8806, 32.6497, 14.8661, 0, 40.7063, 47.2652, 63.9062, 51.8652, 40.4475, 37.5766],
[29.6816, 49.2037, 46.4866, 26.5707, 40.7063, 0, 26.4008, 47.5079, 62.3939, 46.9574, 74.2496],
[27.0185, 43.6578, 32.8024, 39, 47.2652, 26.4008, 0, 21.4009, 42.0476, 69.527, 69.3542],
[43.0813, 54.037, 39.1152, 58.5235, 63.9062, 47.5079, 21.4009, 0, 37.4433, 90.5538, 76.9415],
[38.0789, 32.5269, 19.6977, 55.9732, 51.8652, 62.3939, 42.0476, 37.4433, 0, 90.0777, 45.8912],
[52.8394, 61.1882, 70.3847, 34.4819, 40.4475, 46.9574, 69.527, 90.5538, 90.0777, 0, 74.6726],
[45.607, 26.0768, 38.0789, 51.6236, 37.5766, 74.2496, 69.3542, 76.9415, 45.8912, 74.6726, 0]]

Instancia 4:

numVeh = 3

capacidad = 12

numNodos = 10

costoNodos = [0, 1, 3, 4, 1, 4, 5, 4, 4, 2, 2]

costoAristas = [[0, 14.2127, 33.4216, 49.8197, 24.8395, 34.9857, 44.4072, 36.0555, 18.0278, 21.095, 34.2053],
[14.2127, 0, 19.2094, 35.609, 38.8973, 48.6004, 58.258, 40.025, 24.0208, 23.7697, 36.7151],
[33.4216, 19.2094, 0, 16.4012, 58, 67.3573, 77.1557, 51.3517, 39.3954, 37.1214, 47.3814],
[49.8197, 35.609, 16.4012, 0, 74.3303, 83.4865, 93.3488, 63.8905, 54.3783, 51.6624, 60.1332],
[24.8395, 38.8973, 58, 74.3303, 0, 11.1803, 19.7231, 37.6431, 26.3059, 37.3363, 46.2709],
[34.9857, 48.6004, 67.3573, 83.4865, 11.1803, 0, 10, 38, 31.7648, 48.5077, 57.0789],
[44.4072, 58.258, 77.1557, 93.3488, 19.7231, 10, 0, 46.3897, 41.6773, 56.0446, 63.1981],
[36.0555, 40.025, 51.3517, 63.8905, 37.6431, 38, 46.3897, 0, 18.0278, 57.1402, 70.214],
[18.0278, 24.0208, 39.3954, 54.3783, 26.3059, 31.7648, 41.6773, 18.0278, 0, 39.1152, 52.2015],
[21.095, 23.7697, 37.1214, 51.6624, 37.3363, 48.5077, 56.0446, 57.1402, 39.1152, 0, 13.4536],
[34.2053, 36.7151, 47.3814, 60.1332, 46.2709, 57.0789, 63.1981, 70.214, 52.2015, 13.4536, 0]]

Instancia 5:

numVeh = 3

capacidad = 12

numNodos = 10

costoNodos = [0, 1, 1, 5, 4, 3, 3, 2, 2, 3, 5]

costoAristas = [[0, 13, 12.0416, 17.4642, 23.3238, 31.1448, 32.6956, 33.0151, 37.0135, 36.7151, 39.4462],
[13, 0, 10.2956, 24.0416, 35.1141, 44.1022, 44.9222, 41.8688, 39.5601, 32.3883, 29],
[12.0416, 10.2956, 0, 14.4222, 28.1603, 39.4588, 43.909, 45, 46.8722, 42.2019, 38.9487],
[17.4642, 24.0416, 14.4222, 0, 16.7631, 30.4138, 39.6989, 46.4866, 54.0833, 53.7122, 53.0377],
[23.3238, 35.1141, 28.1603, 16.7631, 0, 14.2127, 26.9258, 39.0128, 52.5547, 58.1378, 62.7694],
[31.1448, 44.1022, 39.4588, 30.4138, 14.2127, 0, 16.0312, 32.311, 50, 60.2163, 68.9493],
[32.6956, 44.9222, 43.909, 39.6989, 26.9258, 16.0312, 0, 17.8045, 37.6431, 51.6236, 64.3817],
[33.0151, 41.8688, 45, 46.4866, 39.0128, 32.311, 17.8045, 0, 20.5913, 37.3363, 53.4603],
[37.0135, 39.5601, 46.8722, 54.0833, 52.5547, 50, 37.6431, 20.5913, 0, 19.6469, 38.9102],
[36.7151, 32.3883, 42.2019, 53.7122, 58.1378, 60.2163, 51.6236, 37.3363, 19.6469, 0, 20],
[39.4462, 29, 38.9487, 53.0377, 62.7694, 68.9493, 64.3817, 53.4603, 38.9102, 20, 0]]

12 Nodos:

Instancia 1:

numVeh = 3

capacidad = 15

numNodos = 12

costoNodos = [0, 1, 2, 5, 4, 1, 2, 5, 3, 3, 5, 1, 1]

costoAristas = [[0, 21, 21.9317, 25.0799, 26.8328, 31.241, 33.7343, 32.28, 26.2488, 27.2947, 29.7321, 37.5366, 40.7063],
[21, 0, 15.8114, 31.4006, 40.8044, 49.2443, 54.4518, 52.7731, 44.3847, 36.7967, 30.0832, 28.2843, 24.2074],
[21.9317, 15.8114, 0, 17.2047, 29.4109, 40.3113, 49.6488, 52.7731, 48.1664, 46.5188, 43.9318, 39.4462],
[25.0799, 31.4006, 17.2047, 0, 14.0357, 26.4764, 39.3573, 47.3814, 47.4131, 52.345, 53.6004, 57.7754, 55.6058],
[26.8328, 40.8044, 29.4109, 14.0357, 0, 12.6491, 27.0185, 38.0789, 41.7732, 51.6236, 56.4624, 63.8201, 64.4438],
[31.241, 49.2443, 40.3113, 26.4764, 12.6491, 0, 15.8114, 29.8329, 37.2156, 51.0784, 58.8218, 68.593, 71.5612],
[33.7343, 54.4518, 49.6488, 39.3573, 27.0185, 15.8114, 0, 16.1245, 27.2947, 44.6878, 55.4437, 67.7422, 73.736],
[32.28, 52.7731, 52.7731, 47.3814, 38.0789, 29.8329, 16.1245, 0, 13.6015, 32.45, 45.1885, 59.1354, 67.7422],
[26.2488, 44.3847, 48.1664, 47.4131, 41.7732, 37.2156, 27.2947, 13.6015, 0, 18.868, 31.9531, 46.3249, 56.0357],
[27.2947, 36.7967, 46.5188, 52.345, 51.6236, 51.0784, 44.6878, 32.45, 18.868, 0, 14.0357, 29.0172, 40.7922],
[29.7321, 30.0832, 43.4166, 53.6004, 56.4624, 58.8218, 55.4437, 45.1885, 31.9531, 14.0357, 0, 15, 27.5136],
[37.5366, 28.2843, 43.9318, 57.7754, 63.8201, 68.593, 67.7422, 59.1354, 46.3249, 29.0172, 15, 0, 14.2127],
[40.7063, 24.2074, 39.4462, 55.6058, 64.4438, 71.5612, 73.736, 67.7422, 56.0357, 40.7922, 27.5136, 14.2127, 0]]

Instancia 2:

numVeh = 3

capacidad = 15

numNodos = 12

costoNodos = [0, 5, 1, 2, 2, 3, 1, 1, 4, 5, 5, 2, 4]

costoAristas = [[0, 21.587, 31.1448, 49.93, 36.2353, 29.6142, 45.2769, 38.8973, 24.1868, 46.2385, 43.8634, 49.8197, 24.5967],
[21.587, 0, 18, 37.4833, 46.6154, 50.01, 62.6418, 58.5235, 34.1321, 67.6757, 45.0999, 40.2492, 16.0312],
[31.1448, 18, 0, 19.9249, 39.0512, 52.811, 60, 70.0071, 50.3289, 75.4718, 63.0714, 56.921, 34.0147],
[49.93, 37.4833, 19.9249, 0, 45.1221, 66.5733, 68.6804, 88.2383, 70.2282, 91.5478, 82.4924, 73.9797, 53.2353],
[36.2353, 46.6154, 39.0512, 45.1221, 0, 28.6356, 23.7697, 60.0167, 59.4643, 55.4707, 80.0562, 84.2912, 58.0517],
[29.6142, 50.01, 52.811, 66.5733, 28.6356, 0, 19.7231, 33.0151, 43.8634, 26.9258, 65.7647, 77.4145, 53.7587],
[45.2769, 62.6418, 60, 68.6804, 23.7697, 19.7231, 0, 51.1957, 63.0317, 40.1995, 84.9588, 94.8683, 69.8355],
[38.8973, 58.5235, 70.0071, 88.2383, 60.0167, 33.0151, 51.1957, 0, 31.1448, 18.0278, 47.8017, 67.1193, 52.4976],
[24.1868, 34.1321, 50.3289, 70.2282, 59.4643, 43.8634, 63.0317, 31.1448, 0, 46.5296, 21.9317, 36.6742, 23.0217],
[46.2385, 67.6757, 75.4718, 91.5478, 55.4707, 26.9258, 40.1995, 18.0278, 46.5296, 0, 65.192, 83.1865, 65.2763],
[43.8634, 45.0999, 63.0714, 82.4924, 80.0562, 65.7647, 84.9588, 47.8017, 21.9317, 65.192, 0, 22.8473, 29.2746],
[49.8197, 40.2492, 56.921, 73.9797, 84.2912, 77.4145, 94.8683, 67.1193, 36.6742, 83.1865, 22.8473, 0, 26.2488],
[24.5967, 16.0312, 34.0147, 53.2353, 58.0517, 53.7587, 69.8355, 52.4976, 23.0217, 65.2763, 29.2746, 26.2488, 0]]

Instancia 3:

numVeh = 3

capacidad = 15

numNodos = 12

costoNodos = [0, 1, 1, 1, 1, 5, 2, 3, 5, 1, 3, 4, 1]

costoAristas = [[0, 27, 26.4008, 26.6271, 28.0179, 28.6531, 33.0151, 30.1496, 29.9666, 29.4109, 28, 27.2029, 26.9258],
[27, 0, 11.4018, 25.0599, 38.2099, 48.0208, 57.2451, 57.0789, 55.5428, 50.1199, 38.8973, 24.5967, 14.5602],
[26.4008, 11.4018, 0, 14.2127, 28.6007, 40.4969, 51.6236, 54.5894, 56.3649, 53.9073, 45.793, 33.9559, 25.02],
[26.6271, 25.0599, 14.2127, 0, 15.2315, 29.1548, 42.107, 48.8467, 54.6717, 56.0357, 52.2015, 44.0114, 36.8782],
[28.0179, 38.2099, 28.6007, 15.2315, 0, 15.2971, 29.4109, 39.8246, 49.6488, 55.0273, 56.0089, 52.2015, 47.4131],
[28.6531, 48.0208, 40.4969, 29.1548, 15.2971, 0, 14.3178, 27.2029, 40.1622, 49.0918, 54.8179, 55.7584, 53.7587],
[33.0151, 57.2451, 51.6236, 42.107, 29.4109, 14.3178, 0, 16.2788, 32, 44.1475, 54.2033, 59.4138, 59.9083],
[30.1496, 57.0789, 54.5894, 48.8467, 39.8246, 27.2029, 16.2788, 0, 16.2788, 29.9666, 43.1393, 52.3546, 55.6597],
[29.9666, 55.5428, 56.3649, 54.6717, 49.6488, 40.1622, 32, 16.2788, 0, 14.8661, 30.8869, 43.9318, 50.01],
[29.4109, 50.1199, 53.9073, 56.0357, 55.0273, 49.0918, 44.1475, 29.9666, 14.8661, 0, 17.4642, 33.0606, 41.2311],
[28, 38.8973, 45.793, 52.2015, 56.0089, 54.8179, 54.2033, 43.1393, 30.8869, 17.4642, 0, 17.088, 26.9258],
[27.2029, 24.5967, 33.9559, 44.0114, 52.2015, 55.7584, 59.4138, 52.3546, 43.9318, 33.0606, 17.088, 0, 10.6301],
[26.9258, 14.5602, 25.02, 36.8782, 47.4131, 53.7587, 59.9083, 55.6597, 50.01, 41.2311, 26.9258, 10.6301, 0]]

Instancia 4:

numVeh = 3

capacidad = 15

numNodos = 12

costoNodos = [0, 4, 5, 2, 1, 2, 4, 3, 1, 4, 2, 5, 5]

costoAristas = [[0, 26.1725, 36.0555, 24.8395, 32.7567, 18.6815, 27.6586, 17.2627, 29.4109, 17.0294, 29, 16.2788, 35.7771],
[26.1725, 0, 17.4642, 18.868, 34.6699, 34.4384, 49.3356, 43, 55.3173, 40.3113, 41.2311, 21.2132, 19.9249],
[36.0555, 17.4642, 0, 14.0357, 25.9422, 35.0571, 51.0392, 49.98, 64.846, 52.6308, 57.4543, 37.2156, 36.0555],
[24.8395, 18.868, 14.0357, 0, 15.8114, 21.0238, 37.0135, 36.6742, 52.1536, 41.8688, 50.5964, 31.4006, 38.4838],
[32.7567, 34.6699, 25.9422, 15.8114, 0, 18.4391, 31.305, 37.6431, 53.9073, 48.4665, 61.4003, 44.1814, 54.1202],
[18.6815, 34.4384, 35.0571, 21.0238, 18.4391, 0, 16, 19.2094, 35.4683, 31.5753, 47.2652, 34, 50.2494],
[27.6586, 49.3356, 51.0392, 37.0135, 31.305, 16, 0, 15.5242, 27.8927, 32.573, 51.4781, 43.8634, 62.9682],
[17.2627, 43, 49.98, 36.6742, 37.6431, 19.2094, 15.5242, 0, 16.2788, 17.088, 36.2353, 31.7648, 52.5547],
[29.4109, 55.3173, 64.846, 52.1536, 53.9073, 35.4683, 27.8927, 16.2788, 0, 17.4642, 34.4093, 39.1152, 60.407],
[17.0294, 40.3113, 52.6308, 41.8688, 48.4665, 31.5753, 32.573, 17.088, 17.4642, 0, 19.4165, 22.0227, 43.1045],
[29, 41.2311, 57.4543, 50.5964, 61.4003, 47.2652, 51.4781, 36.2353, 34.4093, 19.4165, 0, 20.2485, 34.5398],
[16.2788, 21.2132, 37.2156, 31.4006, 44.1814, 34, 43.8634, 31.7648, 39.1152, 22.0227, 20.2485, 0, 21.3776],
[35.7771, 19.9249, 36.0555, 38.4838, 54.1202, 50.2494, 62.9682, 52.5547, 60.407, 43.1045, 34.5398, 21.3776, 0]]

Instancia 5:

numVeh = 3

capacidad = 15

numNodos = 12

costoNodos = [0, 1, 1, 1, 4, 3, 1, 3, 5, 4, 3, 5, 4]

costoAristas = [[0, 20.5913, 24.5153, 25, 17.0294, 29.4279, 34.7131, 38.4187, 33.5261, 39.6989, 33.0606, 27.7308, 28.4253],
[20.5913, 0, 19.105, 44.1475, 33.0151, 18.6011, 36.3456, 58.8218, 35.609, 20, 45.8803, 16.1555, 37.9473],
[24.5153, 19.105, 0, 38.4187, 41.4367, 37.6431, 53.1413, 59.4054, 17, 25.0799, 57.0789, 7.07107, 23.0868],
[25, 44.1475, 38.4187, 0, 29.4109, 54.231, 54.5894, 24.5153, 35.3412, 60.8358, 42.638, 44.6542, 23.0868],
[17.0294, 33.0151, 41.4367, 29.4109, 0, 32.311, 25.632, 29.8329, 49.8197, 53.0094, 16.2788, 43.9659, 42.5441],
[29.4279, 18.6011, 37.6431, 54.231, 32.311, 0, 21.8403, 61.9839, 53.7587, 31.0161, 38.8973, 34.4819, 54.2033],
[34.7131, 36.3456, 53.1413, 54.5894, 25.632, 21.8403, 0, 53.0377, 66.7308, 52.469, 22.1359, 52.1728, 63.1269],
[38.4187, 58.8218, 59.4054, 24.5153, 29.8329, 61.9839, 53.0377, 0, 59.4643, 78.1025, 33.2415, 64.5368, 47.5395],
[33.5261, 35.609, 17, 35.3412, 49.8197, 53.7587, 66.7308, 59.4643, 0, 40.4475, 66.0984, 23.0868, 12.8062],
[39.6989, 20, 25.0799, 60.8358, 53.0094, 31.0161, 52.469, 78.1025, 40.4475, 0, 65.307, 18.0278, 48.1664],
[33.0606, 45.8803, 57.0789, 42.638, 16.2788, 38.8973, 22.1359, 33.2415, 66.0984, 65.307, 0, 58.8558, 58.5235],
[27.7308, 16.1555, 7.07107, 44.6542, 43.9659, 34.4819, 52.1728, 64.5368, 23.0868, 18.0278, 58.8558, 0, 30.1496],
[28.4253, 37.9473, 23.0868, 23.0868, 42.5441, 54.2033, 63.1269, 47.5395, 12.8062, 48.1664, 58.5235, 30.1496, 0]]