

Vaishnavi Patel

The python version I used is 3.7

Question 4: Thank you Vertex

Edge: 38	has neighboring nodes:	949	230
Edge: 39	has neighboring nodes:	867	519
Edge: 40	has neighboring nodes:	259	70
Edge: 41	has neighboring nodes:	927	96
Edge: 42	has neighboring nodes:	476	998
Edge: 43	has neighboring nodes:	840	84
Edge: 44	has neighboring nodes:	552	816
Edge: 45	has neighboring nodes:	727	929
Edge: 46	has neighboring nodes:	139	127
Edge: 47	has neighboring nodes:	117	629
Edge: 48	has neighboring nodes:	97	688
Edge: 49	has neighboring nodes:	552	625
Edge: 50	has neighboring nodes:	161	636
Edge: 51	has neighboring nodes:	967	759
Edge: 52	has neighboring nodes:	390	721
Edge: 53	has neighboring nodes:	800	620
Edge: 54	has neighboring nodes:	568	714
Edge: 55	has neighboring nodes:	796	987
Edge: 56	has neighboring nodes:	718	116
Edge: 57	has neighboring nodes:	817	962
Edge: 58	has neighboring nodes:	922	909
Edge: 59	has neighboring nodes:	405	838
Edge: 60	has neighboring nodes:	201	238
Edge: 61	has neighboring nodes:	924	666
Edge: 62	has neighboring nodes:	81	908
Edge: 63	has neighboring nodes:	386	128
Edge: 64	has neighboring nodes:	593	426
Edge: 65	has neighboring nodes:	606	855
Edge: 66	has neighboring nodes:	827	740
Edge: 67	has neighboring nodes:	725	692
Edge: 68	has neighboring nodes:	167	769
Edge: 69	has neighboring nodes:	497	788
Edge: 70	has neighboring nodes:	939	344
Edge: 71	has neighboring nodes:	710	584
Edge: 72	has neighboring nodes:	669	834
Edge: 73	has neighboring nodes:	581	844
Edge: 74	has neighboring nodes:	701	945
Edge: 75	has neighboring nodes:	743	208
Edge: 76	has neighboring nodes:	582	955
Edge: 77	has neighboring nodes:	375	897
Edge: 78	has neighboring nodes:	465	291
Edge: 79	has neighboring nodes:	124	623
Edge: 80	has neighboring nodes:	246	497
Edge: 81	has neighboring nodes:	172	533
Edge: 82	has neighboring nodes:	335	557
Edge: 83	has neighboring nodes:	317	601

Edge: 960	has neighboring nodes:	986	966
Edge: 961	has neighboring nodes:	999	961
Edge: 962	has neighboring nodes:	972	977
Edge: 963	has neighboring nodes:	988	991
Edge: 964	has neighboring nodes:	978	996
Edge: 965	has neighboring nodes:	978	973
Edge: 966	has neighboring nodes:	967	999
Edge: 967	has neighboring nodes:	996	985
Edge: 968	has neighboring nodes:	989	977
Edge: 969	has neighboring nodes:	969	972
Edge: 970	has neighboring nodes:	984	976
Edge: 971	has neighboring nodes:	981	993
Edge: 972	has neighboring nodes:	993	989
Edge: 973	has neighboring nodes:	991	990
Edge: 974	has neighboring nodes:	981	987
Edge: 975	has neighboring nodes:	984	981
Edge: 976	has neighboring nodes:	976	993
Edge: 977	has neighboring nodes:	994	996
Edge: 978	has neighboring nodes:	988	980
Edge: 979	has neighboring nodes:	987	979
Edge: 980	has neighboring nodes:	984	994
Edge: 981	has neighboring nodes:	981	997
Edge: 982	has neighboring nodes:	996	987
Edge: 983	has neighboring nodes:	998	991
Edge: 984	has neighboring nodes:	987	998
Edge: 985	has neighboring nodes:	985	992
Edge: 986	has neighboring nodes:	987	997
Edge: 987	has neighboring nodes:	995	997
Edge: 988	has neighboring nodes:	990	996
Edge: 989	has neighboring nodes:	989	997
Edge: 990	has neighboring nodes:	996	992
Edge: 991	has neighboring nodes:	998	993
Edge: 992	has neighboring nodes:	995	997
Edge: 993	has neighboring nodes:	997	999
Edge: 994	has neighboring nodes:	995	999
Edge: 995	has neighboring nodes:	996	998
Edge: 996	has neighboring nodes:	999	997
Edge: 997	has neighboring nodes:	997	998
Edge: 998	has neighboring nodes:	998	
Edge: 999	has neighboring nodes:	999	

*****mDFS*****

937,866,861,756,748,712,687,684,678,677,675,673,660,657,655,647,628,627,614,603,638,590,585,57
5,569,554,548,544,707,528,542,527,518,512,511,508,507,530,506,503,502,495,493,489,587,524,488,
487,482,484,481,475,472,471,467,466,463,461,459,442,441,439,709,438,436,433,430,428,421,418,42
9,417,416,573,414,410,408,404,403,451,398,397,774,392,389,388,387,385,380,377,650,690,373,372,
370,369,610,365,360,357,356,354,353,349,347,659,345,379,343,383,355,340,339,338,336,453,334,50
0,331,496,330,329,327,555,663,324,323,321,411,320,314,325,313,312,310,309,407,307,621,303,301,
505,757,775,300,299,798,815,402,431,641,599,617,649,297,296,483,293,290,382,289,287,286,284,28
3,456,580,282,368,278,277,276,735,791,273,272,271,270,269,268,598,261,473,258,257,298,363,256,
491,326,764,255,253,274,520,662,409,679,252,288,250,249,245,243,242,241,239,574,683,237,234,22
8,394,227,248,226,224,292,378,498,689,223,221,220,531,219,534,218,217,215,213,251,711,626,212,
211,546,477,210,419,209,244,715,204,203,202,400,583,200,316,199,197,196,194,193,551,667,700,76
2,440,595,803,192,235,266,190,189,634,685,187,412,186,185,182,180,280,179,654,178,177,176,175,
174,766,173,171,486,604,616,751,170,279,306,169,448,480,168,181,166,164,264,319,413,163,578,16
0,812,158,157,156,154,153,478,152,567,151,318,517,784,818,150,295,149,184,147,722,144,532,594,
143,142,214,308,763,141,570,140,510,613,138,206,207,305,263,597,642,137,136,367,395,155,460,13
4,132,537,781,131,222,130,126,425,125,159,198,458,322,123,122,337,682,121,420,919,120,304,435,
602,765,588,119,424,736,118,523,115,572,785,114,384,113,695,878,111,563,110,107,129,229,697,10
6,135,315,536,104,183,434,516,540,103,362,101,162,100,605,99,422,648,95,786,358,479,94,108,447
,797,302,332,645,93,165,449,254,92,91,90,374,89,457,88,231,260,87,776,86,535,787,887,415,85,28
5,767,83,601,317,82,335,80,246,79,623,652,124,846,78,291,465,509,589,77,375,76,582,75,208,275,
633,719,708,826,611,779,74,73,72,669,71,584,710,69,68,167,632,65,855,64,426,593,653,608,63,128
,225,522,693,386,864,61,60,238,547,201,59,405,58,57,817,56,116,581,543,780,54,714,891,568,656,
851,53,52,390,721,769,799,51,759,50,636,161,612,834,49,625,47,629,117,195,146,46,127,191,139,4
54,188,233,45,44,552,42,476,515,680,41,96,631,724,40,70,344,446,468,615,259,808,39,519,705,772
,871,888,38,230,469,37,98,525,359,423,944,746,619,704,728,867,341,36,731,733,847,35,820,865,34
,366,553,33,32,133,443,31,236,857,596,703,752,758,30,526,809,843,381,29,492,348,813,499,28,265
,558,651,27,48,688,97,351,672,894,148,26,577,842,670,25,490,674,545,550,901,562,750,62,81,533,
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2,761,21,333,462,566,474,20,393,606,432,464,661,844,882,564,713,869,737,19,754,810,821,18,427,
701,885,17,216,624,788,832,841,852,16,66,827,839,15,43,84,281,455,539,671,740,805,829,836,863,
565,696,346,485,840,376,504,600,14,391,691,559,579,716,745,793,105,513,586,856,13,618,622,908,
717,12,501,11,205,350,450,800,399,406,694,668,771,744,749,768,790,893,445,571,825,877,437,777,
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,607,792,720,732,7,401,538,699,794,935,620,837,881,873,311,727,328,664,741,802,811,912,870,807
,879,6,804,822,904,934,102,452,814,823,922,549,760,884,971,640,643,729,109,644,880,952,890,262
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112,470,862,902,959,681,698,848,909,926,950,954,957,930,961,916,958,927,982,734,860,943,920,96
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991,993,986,987,995,996,997,998,999,

*****Kahns:*****

```
0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,
43,44,45,46,47,48,49,50,51,52,53,54,55,56,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83
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,618,622,624,647,649,656,662,664,668,677,678,680,689,697,726,734,746,800,812,870,21,479,128,760,305,134,371,131,535,
323,456,258,155,168,174,58,272,216,364,228,213,223,276,297,335,349,57,101,532,393,251,262,234,291,270,218,220,274,43
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9,795,628,480,481,839,631,653,570,826,520,691,777,675,684,816,894,643,791,802,829,794,597,632,423,601,814,333,577,86
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0,293,754,596,703,542,560,593,543,511,585,464,871,329,486,658,621,645,539,704,798,755,644,750,506,953,679,683,711,66
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7,810,723,821,805,745,866,773,909,781,848,714,615,778,690,654,701,841,521,602,715,767,811,500,700,761,598,699,730,73
1,605,716,435,744,681,663,563,888,707,824,902,879,801,863,860,626,763,613,783,809,695,797,603,751,752,914,846,864,89
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3,856,853,924,836,625,807,822,929,833,788,827,741,904,638,847,782,803,819,661,919,849,834,881,724,787,806,765,872,88
3,776,828,813,766,899,945,642,796,808,891,939,852,838,900,651,887,907,835,862,790,906,915,898,931,844,936,874,910,86
7,911,878,882,823,905,735,903,928,901,748,858,840,884,908,820,943,917,895,880,948,923,949,837,933,861,885,922,935,92
5,896,932,952,954,886,875,951,913,934,947,912,967,963,892,918,944,959,961,937,926,982,995,938,968,
PS C:\Users\HP.LAPTOP-T27KQ4SL> █
```

I node you want me:

```
----- 0 -----  
edge : 1 : weight : 10 :  
edge : 2 : weight : 1 :  
edge : 3 : weight : 2 :  
edge : 4 : weight : 8 :  
edge : 5 : weight : 3 :  
edge : 6 : weight : 9 :  
edge : 7 : weight : 8 :  
edge : 8 : weight : 10 :  
edge : 9 : weight : 9 :  
edge : 10 : weight : 2 :
```

```
----- 1 -----  
edge : 0 : weight : 9 :  
edge : 2 : weight : 7 :  
edge : 3 : weight : 10 :  
edge : 4 : weight : 5 :  
edge : 5 : weight : 4 :  
edge : 6 : weight : 10 :  
edge : 7 : weight : 10 :  
edge : 8 : weight : 8 :  
edge : 9 : weight : 6 :  
edge : 10 : weight : 4 :
```

```
----- 2 -----  
edge : 0 : weight : 9 :  
edge : 1 : weight : 10 :  
edge : 3 : weight : 5 :  
edge : 4 : weight : 7 :  
edge : 5 : weight : 8 :  
edge : 6 : weight : 8 :  
edge : 7 : weight : 1 :  
edge : 8 : weight : 7 :  
edge : 9 : weight : 8 :  
edge : 10 : weight : 5 :
```

```
----- 3 -----  
edge : 0 : weight : 4 :  
edge : 1 : weight : 10 :  
edge : 2 : weight : 9 :  
edge : 4 : weight : 6 :  
edge : 5 : weight : 9 :
```

```
edge : 9 : weight : 1 :
edge : 10 : weight : 5 :
----- 4 -----
edge : 0 : weight : 10 :
edge : 1 : weight : 7 :
edge : 2 : weight : 3 :
edge : 3 : weight : 3 :
edge : 5 : weight : 3 :
edge : 6 : weight : 9 :
edge : 7 : weight : 8 :
edge : 8 : weight : 1 :
edge : 9 : weight : 10 :
edge : 10 : weight : 5 :
----- 5 -----
edge : 0 : weight : 2 :
edge : 1 : weight : 5 :
edge : 2 : weight : 7 :
edge : 3 : weight : 8 :
edge : 4 : weight : 8 :
edge : 6 : weight : 6 :
edge : 7 : weight : 4 :
edge : 8 : weight : 10 :
edge : 9 : weight : 1 :
edge : 10 : weight : 9 :
----- 6 -----
edge : 0 : weight : 9 :
edge : 1 : weight : 5 :
edge : 2 : weight : 6 :
edge : 3 : weight : 9 :
edge : 4 : weight : 10 :
edge : 5 : weight : 3 :
edge : 7 : weight : 4 :
edge : 8 : weight : 10 :
edge : 9 : weight : 5 :
edge : 10 : weight : 10 :
----- 7 -----
edge : 0 : weight : 4 :
edge : 1 : weight : 3 :
edge : 2 : weight : 10 :
edge : 3 : weight : 4 :
edge : 4 : weight : 6 :
```

```
edge : 7 : weight : 3 :  
edge : 9 : weight : 10 :  
edge : 10 : weight : 2 :
```

----- 9 -----

```
edge : 0 : weight : 3 :  
edge : 1 : weight : 8 :  
edge : 2 : weight : 4 :  
edge : 3 : weight : 5 :  
edge : 4 : weight : 3 :  
edge : 5 : weight : 5 :  
edge : 6 : weight : 6 :  
edge : 7 : weight : 6 :  
edge : 8 : weight : 8 :  
edge : 10 : weight : 4 :
```

----- 10 -----

```
edge : 0 : weight : 10 :  
edge : 1 : weight : 10 :  
edge : 2 : weight : 10 :  
edge : 3 : weight : 1 :  
edge : 4 : weight : 9 :  
edge : 5 : weight : 5 :  
edge : 6 : weight : 5 :  
edge : 7 : weight : 7 :  
edge : 8 : weight : 1 :  
edge : 9 : weight : 4 :
```

The finalized length: 11

*****DIJKSTRAS ALGORITHM FOR RANDOM GRAPH*****

```
Node: 0 : Distance: 0  
Node: 1 : Distance: 5  
Node: 2 : Distance: 1  
Node: 3 : Distance: 2  
Node: 4 : Distance: 4  
Node: 5 : Distance: 3  
Node: 6 : Distance: 4  
Node: 7 : Distance: 2  
Node: 8 : Distance: 3  
Node: 9 : Distance: 3  
Node: 10 : Distance: 2
```

*****LINKED LIST*****

----- 0 -----

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

Node: 9 : Distance: 3
Node: 10 : Distance: 2

*****LINKED LIST*****

```
----- 0 -----  
edge : 1 : weight : 1 :  
----- 1 -----  
edge : 2 : weight : 1 :  
----- 2 -----  
edge : 3 : weight : 1 :  
----- 3 -----  
edge : 4 : weight : 1 :  
----- 4 -----  
edge : 5 : weight : 1 :  
----- 5 -----  
edge : 6 : weight : 1 :  
----- 6 -----  
edge : 7 : weight : 1 :  
----- 7 -----  
edge : 8 : weight : 1 :  
----- 8 -----  
edge : 9 : weight : 1 :  
----- 9 -----  
edge : 10 : weight : 1 :  
----- 10 -----
```

The finalized length: 11

*****DIJKSTRAS FOR LINKED LIST*****

Node: 0 : Distance: 0
Node: 1 : Distance: 1
Node: 2 : Distance: 2
Node: 3 : Distance: 3
Node: 4 : Distance: 4
Node: 5 : Distance: 5
Node: 6 : Distance: 6
Node: 7 : Distance: 7
Node: 8 : Distance: 8
Node: 9 : Distance: 9
Node: 10 : Distance: 10

PS C:\Users\HP.LAPTOP-T27KQ4SL> □

PROBLEMS	OUTPUT	DEBUG CONSOLE	TERMINAL
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Node: 9974	:	Distance: 9974	
Node: 9975	:	Distance: 9975	
Node: 9976	:	Distance: 9976	
Node: 9977	:	Distance: 9977	
Node: 9978	:	Distance: 9978	
Node: 9979	:	Distance: 9979	
Node: 9980	:	Distance: 9980	
Node: 9981	:	Distance: 9981	
Node: 9982	:	Distance: 9982	
Node: 9983	:	Distance: 9983	
Node: 9984	:	Distance: 9984	
Node: 9969	:	Distance: 9969	
Node: 9970	:	Distance: 9970	
Node: 9971	:	Distance: 9971	
Node: 9972	:	Distance: 9972	
Node: 9973	:	Distance: 9973	
Node: 9974	:	Distance: 9974	
Node: 9975	:	Distance: 9975	
Node: 9976	:	Distance: 9976	
Node: 9977	:	Distance: 9977	
Node: 9978	:	Distance: 9978	
Node: 9979	:	Distance: 9979	
Node: 9980	:	Distance: 9980	
Node: 9981	:	Distance: 9981	
Node: 9982	:	Distance: 9982	
Node: 9983	:	Distance: 9983	
Node: 9984	:	Distance: 9984	
Node: 9985	:	Distance: 9985	
Node: 9986	:	Distance: 9986	
Node: 9987	:	Distance: 9987	
Node: 9988	:	Distance: 9988	
Node: 9989	:	Distance: 9989	
Node: 9990	:	Distance: 9990	
Node: 9991	:	Distance: 9991	
Node: 9992	:	Distance: 9992	
Node: 9993	:	Distance: 9993	
Node: 9994	:	Distance: 9994	
Node: 9995	:	Distance: 9995	
Node: 9996	:	Distance: 9996	
Node: 9997	:	Distance: 9997	
Node: 9998	:	Distance: 9998	
Node: 9999	:	Distance: 9999	
10000	:		

```
95 for node in nodes:print("Node: ", node.name, " : Distance: "
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

```
Node: 9961 : Distance: 9961
Node: 9962 : Distance: 9962
Node: 9963 : Distance: 9963
Node: 9964 : Distance: 9964
Node: 9965 : Distance: 9965
Node: 9966 : Distance: 9966
Node: 9967 : Distance: 9967
Node: 9968 : Distance: 9968
Node: 9969 : Distance: 9969
Node: 9970 : Distance: 9970
Node: 9971 : Distance: 9971
Node: 9972 : Distance: 9972
Node: 9973 : Distance: 9973
Node: 9974 : Distance: 9974
Node: 9975 : Distance: 9975
Node: 9976 : Distance: 9976
Node: 9977 : Distance: 9977
Node: 9978 : Distance: 9978
Node: 9979 : Distance: 9979
Node: 9980 : Distance: 9980
Node: 9981 : Distance: 9981
Node: 9982 : Distance: 9982
Node: 9983 : Distance: 9983
Node: 9984 : Distance: 9984
Node: 9985 : Distance: 9985
Node: 9986 : Distance: 9986
Node: 9987 : Distance: 9987
Node: 9988 : Distance: 9988
Node: 9989 : Distance: 9989
Node: 9990 : Distance: 9990
Node: 9991 : Distance: 9991
Node: 9992 : Distance: 9992
Node: 9993 : Distance: 9993
Node: 9994 : Distance: 9994
Node: 9995 : Distance: 9995
Node: 9996 : Distance: 9996
Node: 9997 : Distance: 9997
Node: 9998 : Distance: 9998
Node: 9999 : Distance: 9999
```

```
Number of Nodes finalized in dijkstras: 10000
```

```
PS C:\Users\HP.LAPTOP-T27KQ4SL> █
```

Question: Wish upon a star

```
GRID[ 90 , 89 ] = 8990
GRID[ 91 , 89 ] = 8991
GRID[ 92 , 89 ] = 8992
GRID[ 93 , 89 ] = 8993
GRID[ 94 , 89 ] = 8994
GRID[ 95 , 89 ] = 8995
GRID[ 96 , 89 ] = 8996
GRID[ 97 , 89 ] = 8997
GRID[ 98 , 89 ] = 8998
GRID[ 99 , 89 ] = 8999
GRID[ 0 , 90 ] = 9000
GRID[ 1 , 90 ] = 9001
GRID[ 2 , 90 ] = 9002
GRID[ 3 , 90 ] = 9003
GRID[ 4 , 90 ] = 9004
GRID[ 5 , 90 ] = 9005
GRID[ 6 , 90 ] = 9006
GRID[ 7 , 90 ] = 9007
GRID[ 8 , 90 ] = 9008
GRID[ 9 , 90 ] = 9009
GRID[ 10 , 90 ] = 9010
GRID[ 11 , 90 ] = 9011
GRID[ 12 , 90 ] = 9012
GRID[ 13 , 90 ] = 9013
GRID[ 14 , 90 ] = 9014
GRID[ 15 , 90 ] = 9015
GRID[ 16 , 90 ] = 9016
GRID[ 17 , 90 ] = 9017
GRID[ 18 , 90 ] = 9018
GRID[ 19 , 90 ] = 9019
GRID[ 20 , 90 ] = 9020
GRID[ 21 , 90 ] = 9021
GRID[ 22 , 90 ] = 9022
GRID[ 23 , 90 ] = 9023
GRID[ 24 , 90 ] = 9024
GRID[ 25 , 90 ] = 9025
GRID[ 26 , 90 ] = 9026
GRID[ 27 , 90 ] = 9027
GRID[ 28 , 90 ] = 9028
GRID[ 29 , 90 ] = 9029
GRID[ 30 , 90 ] = 9030
GRID[ 31 , 90 ] = 9031
GRID[ 32 , 90 ] = 9032
GRID[ 33 , 90 ] = 9033
GRID[ 34 , 90 ] = 9034
GRID[ 35 , 90 ] = 9035
```

```
GRID[ 44 , 94 ] = 9444
GRID[ 45 , 94 ] = 9445
GRID[ 46 , 94 ] = 9446
GRID[ 47 , 94 ] = 9447
GRID[ 48 , 94 ] = 9448
GRID[ 49 , 94 ] = 9449
GRID[ 50 , 94 ] = 9450
GRID[ 51 , 94 ] = 9451
GRID[ 52 , 94 ] = 9452
GRID[ 53 , 94 ] = 9453
GRID[ 54 , 94 ] = 9454
GRID[ 55 , 94 ] = 9455
GRID[ 56 , 94 ] = 9456
GRID[ 57 , 94 ] = 9457
GRID[ 58 , 94 ] = 9458
GRID[ 59 , 94 ] = 9459
GRID[ 60 , 94 ] = 9460
GRID[ 61 , 94 ] = 9461
GRID[ 62 , 94 ] = 9462
GRID[ 63 , 94 ] = 9463
GRID[ 64 , 94 ] = 9464
GRID[ 65 , 94 ] = 9465
GRID[ 66 , 94 ] = 9466
GRID[ 67 , 94 ] = 9467
GRID[ 68 , 94 ] = 9468
GRID[ 69 , 94 ] = 9469
GRID[ 70 , 94 ] = 9470
GRID[ 71 , 94 ] = 9471
GRID[ 72 , 94 ] = 9472
GRID[ 73 , 94 ] = 9473
GRID[ 74 , 94 ] = 9474
GRID[ 75 , 94 ] = 9475
GRID[ 76 , 94 ] = 9476
GRID[ 77 , 94 ] = 9477
GRID[ 78 , 94 ] = 9478
GRID[ 79 , 94 ] = 9479
GRID[ 80 , 94 ] = 9480
GRID[ 81 , 94 ] = 9481
GRID[ 82 , 94 ] = 9482
GRID[ 83 , 94 ] = 9483
GRID[ 84 , 94 ] = 9484
GRID[ 85 , 94 ] = 9485
GRID[ 86 , 94 ] = 9486
GRID[ 87 , 94 ] = 9487
GRID[ 88 , 94 ] = 9488
GRID[ 89 , 94 ] = 9489
```

```
PROBLEMS 3 OUTPUT DEBUG CONSOLE TERMINAL
GRID[ 94 , 99 ] = 9994
GRID[ 95 , 99 ] = 9995
GRID[ 96 , 99 ] = 9996
GRID[ 97 , 99 ] = 9997
GRID[ 98 , 99 ] = 9998
GRID[ 99 , 99 ] = 9999

*****AStar on grid with 10000 [X,Y] matrix*****
AStar path:
[ 0 , 0 ] ~> [ 0 , 1 ] ~> [ 0 , 2 ] ~> [ 0 , 3 ] ~> [ 0 , 4 ] ~> [ 1 , 4 ] ~> [ 1 , 5 ] ~> [ 2 , 5 ] ~> [ 2 , 6 ] ~> [ 3 , 6 ]
[  ] ~> [ 3 , 7 ] ~> [ 4 , 7 ] ~> [ 4 , 8 ] ~> [ 4 , 9 ] ~> [ 4 , 10 ] ~> [ 4 , 11 ] ~> [ 4 , 12 ] ~> [ 4 , 13 ]
[  ] ~> [ 5 , 13 ] ~> [ 6 , 13 ] ~> [ 6 , 14 ] ~> [ 7 , 14 ] ~> [ 7 , 15 ] ~> [ 7 , 16 ] ~> [ 7 , 17 ]
[  ] ~> [ 8 , 17 ] ~> [ 9 , 17 ] ~> [ 10 , 17 ] ~> [ 11 , 17 ] ~> [ 11 , 18 ] ~> [ 12 , 18 ] ~> [ 13 , 18 ]
[  ] ~> [ 14 , 18 ] ~> [ 15 , 18 ] ~> [ 15 , 19 ] ~> [ 15 , 20 ] ~> [ 15 , 21 ] ~> [ 15 , 22 ] ~> [ 15 , 23 ]
[  ] ~> [ 16 , 23 ] ~> [ 16 , 24 ] ~> [ 17 , 24 ] ~> [ 18 , 24 ] ~> [ 19 , 24 ] ~> [ 20 , 24 ] ~> [ 21 , 24 ]
[  ] ~> [ 21 , 25 ] ~> [ 21 , 26 ] ~> [ 21 , 27 ] ~> [ 22 , 27 ] ~> [ 23 , 27 ] ~> [ 24 , 27 ] ~> [ 24 , 28 ]
[  ] ~> [ 25 , 28 ] ~> [ 25 , 29 ] ~> [ 26 , 29 ] ~> [ 27 , 29 ] ~> [ 28 , 29 ] ~> [ 28 , 30 ] ~> [ 29 , 30 ]
[  ] ~> [ 29 , 31 ] ~> [ 30 , 31 ] ~> [ 31 , 31 ] ~> [ 32 , 31 ] ~> [ 32 , 32 ] ~> [ 33 , 32 ] ~> [ 33 , 33 ]
[  ] ~> [ 34 , 33 ] ~> [ 34 , 34 ] ~> [ 35 , 34 ] ~> [ 35 , 35 ] ~> [ 35 , 36 ] ~> [ 35 , 37 ] ~> [ 36 , 37 ]
[  ] ~> [ 36 , 38 ] ~> [ 36 , 39 ] ~> [ 36 , 40 ] ~> [ 37 , 40 ] ~> [ 38 , 40 ] ~> [ 38 , 41 ] ~> [ 38 , 42 ]
[  ] ~> [ 39 , 42 ] ~> [ 39 , 43 ] ~> [ 39 , 44 ] ~> [ 39 , 45 ] ~> [ 40 , 45 ] ~> [ 40 , 46 ] ~> [ 40 , 47 ]
[  ] ~> [ 40 , 48 ] ~> [ 41 , 48 ] ~> [ 41 , 49 ] ~> [ 42 , 49 ] ~> [ 43 , 49 ] ~> [ 43 , 50 ] ~> [ 44 , 50 ]
[  ] ~> [ 45 , 50 ] ~> [ 45 , 51 ] ~> [ 46 , 51 ] ~> [ 46 , 52 ] ~> [ 46 , 53 ] ~> [ 47 , 53 ] ~> [ 48 , 53 ]
[  ] ~> [ 49 , 53 ] ~> [ 49 , 54 ] ~> [ 50 , 54 ] ~> [ 51 , 54 ] ~> [ 51 , 55 ] ~> [ 52 , 55 ] ~> [ 52 , 56 ]
[  ] ~> [ 53 , 56 ] ~> [ 54 , 56 ] ~> [ 54 , 57 ] ~> [ 54 , 58 ] ~> [ 55 , 58 ] ~> [ 56 , 58 ] ~> [ 56 , 59 ]
[  ] ~> [ 57 , 59 ] ~> [ 57 , 60 ] ~> [ 58 , 60 ] ~> [ 59 , 60 ] ~> [ 59 , 61 ] ~> [ 59 , 62 ] ~> [ 60 , 62 ]
[  ] ~> [ 61 , 62 ] ~> [ 62 , 62 ] ~> [ 63 , 62 ] ~> [ 64 , 62 ] ~> [ 64 , 63 ] ~> [ 65 , 63 ] ~> [ 65 , 64 ]
[  ] ~> [ 65 , 65 ] ~> [ 66 , 65 ] ~> [ 66 , 66 ] ~> [ 67 , 66 ] ~> [ 67 , 67 ] ~> [ 67 , 68 ] ~> [ 68 , 68 ]
[  ] ~> [ 69 , 68 ] ~> [ 70 , 68 ] ~> [ 71 , 68 ] ~> [ 72 , 68 ] ~> [ 72 , 69 ] ~> [ 72 , 70 ] ~> [ 72 , 71 ]
[  ] ~> [ 72 , 72 ] ~> [ 72 , 73 ] ~> [ 73 , 73 ] ~> [ 73 , 74 ] ~> [ 73 , 75 ] ~> [ 74 , 75 ] ~> [ 75 , 75 ]
[  ] ~> [ 76 , 75 ] ~> [ 76 , 76 ] ~> [ 77 , 76 ] ~> [ 77 , 77 ] ~> [ 78 , 77 ] ~> [ 79 , 77 ] ~> [ 79 , 78 ]
[  ] ~> [ 80 , 78 ] ~> [ 80 , 79 ] ~> [ 81 , 79 ] ~> [ 82 , 79 ] ~> [ 82 , 80 ] ~> [ 82 , 81 ] ~> [ 83 , 81 ]
[  ] ~> [ 84 , 81 ] ~> [ 84 , 82 ] ~> [ 85 , 82 ] ~> [ 86 , 82 ] ~> [ 87 , 83 ] ~> [ 87 , 83 ] ~> [ 88 , 83 ]
[  ] ~> [ 89 , 83 ] ~> [ 90 , 83 ] ~> [ 91 , 83 ] ~> [ 92 , 83 ] ~> [ 92 , 84 ] ~> [ 93 , 84 ] ~> [ 93 , 85 ]
[  ] ~> [ 94 , 85 ] ~> [ 94 , 86 ] ~> [ 95 , 86 ] ~> [ 95 , 87 ] ~> [ 95 , 88 ] ~> [ 95 , 89 ] ~> [ 95 , 90 ]
[  ] ~> [ 95 , 91 ] ~> [ 95 , 92 ] ~> [ 96 , 92 ] ~> [ 96 , 93 ] ~> [ 96 , 94 ] ~> [ 97 , 94 ] ~> [ 97 , 95 ]
[  ] ~> [ 98 , 95 ] ~> [ 98 , 96 ] ~> [ 98 , 97 ] ~> [ 98 , 98 ] ~> [ 98 , 99 ] ~> [ 99 , 99 ]

Number of Nodes finalized in A Star: 199
PS C:\Users\HP.LAPTOP-T27KQ4SL> []
```

Extra Credit:

Size = 10000

Number of Nodes finalized in Dijkstra's = 10000

Number of Nodes finalized in A Star = 199

Yes, there is a big difference in numbers between the two searches. A* goes through less nodes when determining the path while Dijkstra's visits all nodes.