Team 72
Salil Aggarwal
Parth Garg
1)
a)discount = 0.99 step_cost = -team_number/10
Iteration 1
7.200 0.000 49.824 72.000
-1.498 -7.200 -7.200 49.824
-7.200 -7.200 0.000 -7.200
-7.200 -7.200 -14.400 -7.200

Iteration 2
7.200 0.000 54.044 72.000
-2.359 -9.812 36.480 54.044
-9.812 -14.328 0.000 30.835
-14.328 -14.328 -14.400 -14.328

Iteration 3
7.200 0.000 58.786 72.000
-2.702 19.303 44.565 58.786
-11.458 -17.361 0.000 41.708
-17.808 -21.385 -14.400 14.377

Iteration 4
7.200 0.000 60.056 72.000
7.666 28.287 49.590 60.056
-12.193 5.235 0.000 47.617
-20.155 -22.441 -14.400 25.830

Iteration 5
7.200 0.000 60.679 72.000
14.709 35.394 51.219 60.679
-1.817 14.515 0.000 49.792
-21.074 -6.475 -14.400 31.644

Iteration 6
7.200 0.000 60.902 72.000
21.365 38.306 51.936 60.902
5.707 22.089 0.000 50.717
-11.367 0.784 -14.400 33.943

Iteration 7
7.200 0.000 60.995 72.000
24.416 39.912 52.205 60.995
12.473 25.891 0.000 51.076
-3.728 7.744 -14.400 34.902

Iteration 8
7.200 0.000 61.031 72.000
26.358 40.661 52.315 61.031
15.936 28.208 0.000 51.221
3.076 11.511 -14.400 35.282

Iteration 9
7.200 0.000 61.045 72.000
27.294 41.051 52.358 61.045
18.055 29.374 0.000 51.278
6.865 14.020 -14.400 35.434

Iteration 10
7.200 0.000 61.051 72.000
27.813 41.239 52.375 61.051
19.446 30.008 0.000 51.301
9.167 15.318 -14.400 35.495

Iteration 11
7.200 0.000 61.053 72.000
28.099 41.334 52.381 61.053
20.227 30.357 0.000 51.310
10.625 16.048 -14.400 35.519

Iteration 12
7.200 0.000 61.054 72.000
28.252 41.384 52.384 61.054
20.677 30.545 0.000 51.313
11.461 16.469 -14.400 35.528

Iteration 13
7.200 0.000 61.054 72.000
28.336 41.409 52.385 61.054
20.923 30.647 0.000 51.315
11.941 16.700 -14.400 35.532

Iteration 14
7.200 0.000 61.055 72.000
28.380 41.423 52.386 61.055
21.060 30.701 0.000 51.315
12.206 16.829 -14.400 35.533

Iteration 15
7.200 0.000 61.055 72.000
28.404 41.430 52.386 61.055
21.134 30.731 0.000 51.316
12.354 16.898 -14.400 35.534

Iteration 16
7.200 0.000 61.055 72.000
28.417 41.433 52.386 61.055
21.174 30.747 0.000 51.316
12.434 16.936 -14.400 35.534

Iteration 17
7.200 0.000 61.055 72.000
28.424 41.435 52.386 61.055
21.196 30.755 0.000 51.316
12.477 16.957 -14.400 35.534

Iteration 18
7.200 0.000 61.055 72.000
28.428 41.436 52.386 61.055
21.208 30.760 0.000 51.316
12.501 16.968 -14.400 35.534

Iteration 19
7.200 0.000 61.055 72.000
28.430 41.437 52.386 61.055
21.214 30.762 0.000 51.316
12.514 16.974 -14.400 35.534

Iteration 20
7.200 0.000 61.055 72.000
28.431 41.437 52.386 61.055
21.217 30.764 0.000 51.316
12.521 16.977 -14.400 35.534

Iteration 21
7.200 0.000 61.055 72.000
28.432 41.438 52.386 61.055

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21.219 30.765 0.000 51.316
12.524 16.979 -14.400 35.534

Iteration 22
7.200 0.000 61.055 72.000
28.432 41.438 52.386 61.055
21.220 30.765 0.000 51.316
12.526 16.980 -14.400 35.534

Iteration 23
7.200 0.000 61.055 72.000
28.432 41.438 52.386 61.055
21.221 30.765 0.000 51.316
12.527 16.980 -14.400 35.534

policy
0 0 e 0
e e n n
e n 0 n
n n 0 n



1)
b)discount = 0.1 step_cost = -team_number/10
Iteration 1
7.200 0.000 -1.440 72.000
-6.624 -7.200 -7.200 -1.440
-7.200 -7.200 0.000 -7.200
-7.200 -7.200 -14.400 -7.200

Iteration 2
7.200 0.000 -1.526 72.000
-6.762 -7.874 -7.402 -1.526
-7.874 -7.920 0.000 -7.459
-7.920 -7.920 -14.400 -7.920

Iteration 3
7.200 0.000 -1.529 72.000
-6.770 -7.899 -7.411 -1.529
-7.899 -7.988 0.000 -7.471
-7.988 -7.992 -14.400 -7.987
policy
0 0 e 0
n n s n
n e 0 w
n w 0 e

2)
a)step_cost = -X
Iteration 1
7.200 0.000 -14.976 72.000
-66.298 -72.000 -72.000 -14.976
-72.000 -72.000 0.000 -72.000
-72.000 -72.000 -14.400 -72.000

Iteration 2
7.200 0.000 -23.587 72.000
-79.989 -138.764 -92.472 -23.587
-138.764 -143.280 0.000 -98.117
-143.280 -97.661 -14.400 -97.661

Iteration 3
7.200 0.000 -26.466 72.000
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-87.954 -163.274 -102.170 -26.466
-163.274 -177.270 0.000 -110.108
-177.270 -107.258 -14.400 -102.787

Iteration 4
7.200 0.000 -27.711 72.000
-91.169 -175.373 -105.696 -27.711
-175.373 -190.662 0.000 -114.762
-190.662 -111.573 -14.400 -104.481

Iteration 5
7.200 0.000 -28.183 72.000
-92.685 -180.443 -107.154 -28.183
-180.443 -196.603 0.000 -116.670
-196.603 -113.326 -14.400 -105.110

Iteration 6
7.200 0.000 -28.374 72.000
-93.337 -182.734 -107.720 -28.374
-182.734 -199.082 0.000 -117.422
-199.082 -114.088 -14.400 -105.361

Iteration 7
7.200 0.000 -28.449 72.000
-93.629 -183.723 -107.946 -28.449
-183.723 -200.157 0.000 -117.722
-200.157 -114.409 -14.400 -105.460

Iteration 8
7.200 0.000 -28.479 72.000
-93.755 -184.158 -108.035 -28.479
-184.158 -200.616 0.000 -117.841
-200.616 -114.547 -14.400 -105.500

Iteration 9
7.200 0.000 -28.491 72.000
-93.811 -184.347 -108.070 -28.491
-184.347 -200.814 0.000 -117.888
-200.814 -114.606 -14.400 -105.516

Iteration 10
7.200 0.000 -28.496 72.000
-93.835 -184.429 -108.084 -28.496
-184.429 -200.899 0.000 -117.907
-200.899 -114.631 -14.400 -105.522

Iteration 11
7.200 0.000 -28.497 72.000
-93.846 -184.465 -108.090 -28.497
-184.465 -200.935 0.000 -117.914
-200.935 -114.642 -14.400 -105.524

Iteration 12
7.200 0.000 -28.498 72.000
-93.850 -184.481 -108.092 -28.498
-184.481 -200.951 0.000 -117.917
-200.951 -114.647 -14.400 -105.525
policy
0 0 e 0
n n s n
n e 0 w
e e 0 w

2)
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b) step_cost = -X/5
Iteration 1
7.200 0.000 42.624 72.000
-8.698 -14.400 -14.400 42.624
-14.400 -14.400 0.000 -14.400
-14.400 -14.400 -14.400 -14.400

Iteration 2
7.200 0.000 45.418 72.000
-10.984 -24.140 22.152 45.418
-24.140 -28.656 0.000 16.507
-28.656 -28.656 -14.400 -28.656

Iteration 3
7.200 0.000 49.313 72.000
-12.175 -2.082 28.261 49.313
-28.326 -38.745 0.000 24.840
-39.193 -31.479 -14.400 -5.589

Iteration 4
7.200 0.000 50.304 72.000
-10.109 3.941 32.336 50.304
-30.683 -22.689 0.000 29.575
-43.831 -32.757 -14.400 3.294

Iteration 5
7.200 0.000 50.805 72.000
-9.308 9.354 33.622 50.805
-27.690 -16.563 0.000 31.296
-46.283 -31.294 -14.400 7.924

Iteration 6
7.200 0.000 50.982 72.000
-8.693 11.515 34.196 50.982
-26.153 -11.373 0.000 32.035
-44.011 -30.543 -14.400 9.746

Iteration 7
7.200 0.000 51.057 72.000
-7.157 12.697 34.411 51.057
-25.000 -8.995 0.000 32.321
-42.494 -29.190 -14.400 10.511

Iteration 8
7.200 0.000 51.085 72.000
-6.106 13.220 34.498 51.085
-23.433 -7.709 0.000 32.436
-41.297 -27.157 -14.400 10.813

Iteration 9
7.200 0.000 51.097 72.000
-5.537 13.468 34.532 51.097
-22.319 -7.013 0.000 32.482
-39.736 -26.020 -14.400 10.935

Iteration 10
7.200 0.000 51.101 72.000
-5.230 13.589 34.546 51.101
-21.689 -6.637 0.000 32.500
-38.586 -25.314 -14.400 10.983

Iteration 11
7.200 0.000 51.103 72.000
-5.072 13.649 34.551 51.103

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-21.347 -6.442 0.000 32.507
-37.904 -24.902 -14.400 11.002

Iteration 12
7.200 0.000 51.104 72.000
-4.991 13.678 34.553 51.104
-21.168 -6.341 0.000 32.510
-37.524 -24.680 -14.400 11.009

Iteration 13
7.200 0.000 51.104 72.000
-4.950 13.693 34.554 51.104
-21.076 -6.290 0.000 32.511
-37.324 -24.563 -14.400 11.012

Iteration 14
7.200 0.000 51.104 72.000
-4.929 13.700 34.555 51.104
-21.030 -6.265 0.000 32.512
-37.219 -24.503 -14.400 11.013

Iteration 15
7.200 0.000 51.104 72.000
-4.919 13.703 34.555 51.104
-21.006 -6.252 0.000 32.512
-37.166 -24.472 -14.400 11.014

Iteration 16
7.200 0.000 51.104 72.000
-4.914 13.705 34.555 51.104
-20.994 -6.246 0.000 32.512
-37.139 -24.457 -14.400 11.014

Iteration 17
7.200 0.000 51.104 72.000
-4.911 13.706 34.555 51.104
-20.988 -6.242 0.000 32.512
-37.125 -24.449 -14.400 11.014

Iteration 18
7.200 0.000 51.104 72.000
-4.910 13.706 34.555 51.104
-20.986 -6.241 0.000 32.512
-37.119 -24.445 -14.400 11.014

Iteration 19
7.200 0.000 51.104 72.000
-4.909 13.706 34.555 51.104
-20.984 -6.240 0.000 32.512
-37.115 -24.443 -14.400 11.014

Iteration 20
7.200 0.000 51.104 72.000
-4.909 13.707 34.555 51.104
-20.983 -6.240 0.000 32.512
-37.114 -24.442 -14.400 11.014
policy
0 0 e 0
e e n n
n n 0 n
n n 0 n

2)
c) step_cost = -x/4
```

Iteration 1
7.200 0.000 39.024 72.000
-12.298 -18.000 -18.000 39.024
-18.000 -18.000 0.000 -18.000
-18.000 -18.000 -14.400 -18.000

Iteration 2
7.200 0.000 41.105 72.000
-15.297 -31.304 14.988 41.105
-31.304 -35.820 0.000 9.343
-35.820 -32.969 -14.400 -32.969

Iteration 3
7.200 0.000 44.577 72.000
-16.911 -12.774 20.109 44.577
-36.761 -49.156 0.000 16.405
-49.603 -36.215 -14.400 -15.290

Iteration 4
7.200 0.000 45.428 72.000
-15.236 -8.205 23.709 45.428
-39.899 -36.623 0.000 20.553
-55.232 -37.856 -14.400 -7.946

Iteration 5
7.200 0.000 45.869 72.000
-14.618 -3.660 24.823 45.869
-37.643 -32.074 0.000 22.048
-57.400 -36.778 -14.400 -3.934

Iteration 6
7.200 0.000 46.023 72.000
-14.107 -1.878 25.326 46.023
-36.480 -27.801 0.000 22.694
-56.538 -36.221 -14.400 -2.353

Iteration 7
7.200 0.000 46.088 72.000
-13.880 -0.880 25.513 46.088
-35.537 -25.851 0.000 22.943
-55.896 -35.743 -14.400 -1.685

Iteration 8
7.200 0.000 46.112 72.000
-13.759 -0.440 25.590 46.112
-35.070 -24.774 0.000 23.044
-55.217 -35.503 -14.400 -1.421

Iteration 9
7.200 0.000 46.123 72.000
-13.703 -0.229 25.620 46.123
-34.822 -24.273 0.000 23.084
-54.757 -35.372 -14.400 -1.315

Iteration 10
7.200 0.000 46.126 72.000
-13.677 -0.135 25.632 46.126
-34.703 -24.032 0.000 23.100
-54.501 -35.310 -14.400 -1.273

Iteration 11
7.200 0.000 46.128 72.000
-13.665 -0.092 25.636 46.128
-34.647 -23.922 0.000 23.106

-54.376 -35.280 -14.400 -1.257

Iteration 12
7.200 0.000 46.129 72.000
-13.660 -0.074 25.638 46.129
-34.621 -23.871 0.000 23.108
-54.316 -35.266 -14.400 -1.250

Iteration 13
7.200 0.000 46.129 72.000
-13.657 -0.065 25.639 46.129
-34.609 -23.849 0.000 23.109
-54.288 -35.259 -14.400 -1.248

Iteration 14
7.200 0.000 46.129 72.000
-13.656 -0.062 25.639 46.129
-34.604 -23.839 0.000 23.110
-54.276 -35.257 -14.400 -1.246

Iteration 15
7.200 0.000 46.129 72.000
-13.656 -0.060 25.639 46.129
-34.601 -23.835 0.000 23.110
-54.270 -35.255 -14.400 -1.246

Iteration 16
7.200 0.000 46.129 72.000
-13.655 -0.059 25.639 46.129
-34.600 -23.833 0.000 23.110
-54.267 -35.255 -14.400 -1.246

Iteration 17
7.200 0.000 46.129 72.000
-13.655 -0.059 25.639 46.129
-34.600 -23.832 0.000 23.110
-54.266 -35.254 -14.400 -1.246

Iteration 18
7.200 0.000 46.129 72.000
-13.655 -0.059 25.639 46.129
-34.600 -23.831 0.000 23.110
-54.266 -35.254 -14.400 -1.246

Iteration 19
7.200 0.000 46.129 72.000
-13.655 -0.059 25.639 46.129
-34.600 -23.831 0.000 23.110
-54.266 -35.254 -14.400 -1.246

Iteration 20
7.200 0.000 46.129 72.000
-13.655 -0.059 25.639 46.129
-34.600 -23.831 0.000 23.110
-54.265 -35.254 -14.400 -1.246

Iteration 21
7.200 0.000 46.129 72.000
-13.655 -0.059 25.639 46.129
-34.600 -23.831 0.000 23.110
-54.265 -35.254 -14.400 -1.246

Iteration 22
7.200 0.000 46.129 72.000

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-13.655 -0.059 25.639 46.129
-34.600 -23.831 0.000 23.110
-54.265 -35.254 -14.400 -1.246
policy
0 0 e 0
n e e n
n n 0 n
n e 0 n

2)d) step_cost = x
writing only the final iteration
Iteration 459
7.200 0.000 7129.071 72.000
7129.071 7129.071 7129.071 7129.071
7129.071 7129.071 0.000 7129.071
7129.071 7129.071 -14.400 7129.071
policy
0 0 s 0
s s n s
s w 0 e
s w 0 e
```