HW3-Programming

Graded

Student

Brian Bertness

Total Points

30 / 30 pts

Autograder Score

20.0 / 20.0

Passed Tests

test_dEdv (test_MLP.TestMLP) (3/3)
test_dEdv0 (test_MLP.TestMLP) (3/3)
test_dEdw (test_MLP.TestMLP) (4/4)
test_dEdw0 (test_MLP.TestMLP) (4/4)
test_predict (test_MLP.TestMLP) (3/3)
test_update (test_MLP.TestMLP) (3/3)

Question 2

Code Sanity

10 / 10 pts

✔ **– 0 pts** Correct

– 10 pts No sumbission

Autograder Results

test_dEdv (test_MLP.TestMLP) (3/3)

ten tests for dEdv() with random weights and inputs
Input is:
```
[[ -2   3  -2  -8  -2   6   7   7  -4  -8  -3  -7   5   4  -2   5   0  -3
   -5   9  -7   0  -7  -1  -8  -1   9   6  -2   7   0   5 -10   5  -8  -6
   -2  -1  -2  -4   0  -8  -5   3   2  -6   3   0  -9  -4   9   7  -4   2
   -3  -4  -3   5  -6   6   1  -7  -2   3]
 [-10  -3  -6  -3   3  -7 -10   4  -5   3  -6  -4   0   3   4   6  -4  -8
    0  -8  -7   2  -6  -3   9   5 -10   1   0  -2  -8   7  -9   5  -5  -8
    2   5  -8   5  -3  -4   0  -1   0   3   3   7  -8  -2   8   5  -6  -3
    7   9   7   0  -4   9  -7  -4   7   4]
 [  4   4   8   8   0  -6  -9   8  -7  -8  -2   7 -10   1   5   7   7   9
    6   1  -8  -5   9   1   2  -4   7  -7   3  -3  -1  -2   3  -1   2   1
    0  -5   8   3 -10   9  -4   7   4   8  -3  -2  -4   2  -2  -1 -10  -3
    9  -8  -4  -8  -6  -7  -7  -7   0  -3]
 [ -4   9  -5   9   7  -1  -3   4  -3  -1   9   8  -9   9   0  -5   2   6
    8  -1 -10   6   0   3   0   7  -5   1  -6   6  -7   4   6   3  -4  -3
   -7  -2   4  -4   0  -3   2  -4  -3   1   8   9  -3   8 -10  -3   6   2
    4  -3  -7  -4 -10  -3   1   5   9   0]
 [  5  -9   6   7   2  -8 -10  -3  -4   1   6  -2  -2   9   8  -5  -7   2
    8   9  -5  -2  -9   0   5   4  -2  -2   8  -6  -7   4  -4  -1   3  -5
    4   2   2  -5  -6  -4  -2  -3   7  -7  -9   3   2   3   1   6  -9  -6
    2  -8  -7   2  -1  -5 -10  -7   7   3]]
```
label is:
```
[[0. 0. 0. 0. 0. 0. 1. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 1. 0. 0.]
 [0. 1. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 1. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 0. 1.]]
```
z is:
```
[[-1.         -1.         -1.         -0.99995561]
 [-1.         -1.         -1.          0.99999982]
 [-1.         -0.99913172 -1.          0.83509919]
 [ 1.          1.          1.          0.80321507]
 [-1.         -1.         -1.         -1.        ]]
```
y is:
```
[[0.06946238 0.08834908 0.20924765 0.08941491 0.12899764 0.16256509
  0.08984437 0.07304011 0.04281245 0.04626633]
 [0.08993635 0.03649149 0.16813063 0.03543959 0.15992776 0.21726342
  0.1768164  0.06751687 0.02644766 0.02202982]
 [0.08875031 0.03956876 0.17251271 0.03857801 0.15833157 0.21385403
  0.16853882 0.06850859 0.02774755 0.02360966]
 [0.10240785 0.1157906  0.04339573 0.13355339 0.10579242 0.0879259
  0.10117424 0.07667804 0.12019437 0.11308747]
 [0.0694618  0.0883506  0.20924814 0.08941652 0.12899669 0.16256363
  0.0898428  0.07304005 0.0428128  0.04626697]]
```
GT is:
```
[[-0.21520299  0.86303066 -0.7157434  -0.11929564 -1.47046124 -0.66832026
   0.57613185  0.79457242 -0.01962611  0.9749147 ]
 [-0.21512593  0.86219674 -0.71559361 -0.11926214 -1.47032377 -0.66813458
   0.57627819  0.79463191 -0.01960202  0.9749352 ]
 [-0.21520299  0.86303066 -0.7157434  -0.11929564 -1.47046124 -0.66832026
   0.57613185  0.79457242 -0.01962611  0.9749147 ]
```

```
 [ 0.10738607 -0.84925487 -0.07143457 -0.00389931 -0.68407931  0.14135462
   1.2191001  -0.95975945  0.06053819  1.04004854]]
Your answer is:
[[-0.21520299  0.86303066 -0.7157434  -0.11929564 -1.47046124 -0.66832026
   0.57613185  0.79457242 -0.01962611  0.9749147 ]
 [-0.21512593  0.86219674 -0.71559361 -0.11926214 -1.47032377 -0.66813458
   0.57627819  0.79463191 -0.01960202  0.9749352 ]
 [-0.21520299  0.86303066 -0.7157434  -0.11929564 -1.47046124 -0.66832026
   0.57613185  0.79457242 -0.01962611  0.9749147 ]
 [ 0.10738607 -0.84925487 -0.07143457 -0.00389931 -0.68407931  0.14135462
   1.2191001  -0.95975945  0.06053819  1.04004854]]
Input is:
[[  2  -1   8   8  -1  -7   2  -9 -10   9  -6 -10  -6  -1  -7   4   0  -5
   -1   2  -3  -4  -6  -2   3  -1 -10  -2   8   4 -10   6  -7  -9  -2   6
   -3  -6  -3  -9   5  -2   0  -6   4   6   6   6 -10  -6   5   0   3   1
   -3  -8   2   3   7  -5   1   8  -4   5]
 [  0  -9  -9 -10  -1   3   9   1  -1   8   9  -4  -8  -6  -8  -9  -4   6
    5  -5   2  -6  -7   9   8  -3  -5   9  -8 -10  -7  -1   6  -8  -9  -6
    9   2  -2  -1  -1  -1  -9   1   4  -5   9   6   5  -5  -8  -7  -7   4
    7  -1   1   9 -10   4  -3  -8  -3   4]
 [  4   6  -4   5   0  -3  -2  -6   2 -10   5  -5  -1  -5   9  -4   9   5
   -1  -5  -3  -1   2   8  -9   1   3   4   8   0   9   6   0   8   5   9
   -9  -6   8   8   4  -3   9  -7   5  -5   3   4   3  -7  -4  -2  -1   8
    0   9  -8  -8  -5  -7   3 -10   3  -3]
 [ -6  -8   5  -5   2   7   9  -7   9  -8  -5  -7  -4  -3  -8  -6  -3   3
    9   8   8  -4  -6  -7   6  -2  -2   5  -7   3   9   0   6 -10  -9   1
    4   5 -10   0   7   3  -7   9  -1  -3  -9  -2  -9   3  -9  -3  -1  -3
   -3  -4   8   1   4   7  -4  -6  -5 -10]
 [  2   1   5  -3  -9  -2  -5   8 -10   6   6  -4  -8   2   6  -4   7  -2
   -9   1   1 -10  -1  -9   1   2  -5   8  -1  -1  -5  -9 -10  -9  -2   5
    6 -10  -9  -1  -6   5  -2  -9   3  -3  -9  -6   9   3  -7  -1  -3  -6
   -6  -6   0   0   1  -4   2   9  -7   9]]
label is:
[[0. 0. 0. 0. 0. 0. 0. 1. 0. 0.]
 [0. 0. 0. 0. 0. 0. 1. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [0. 0. 0. 0. 0. 0. 0. 0. 1. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 1. 0.]]
z is:
[[-1.         -1.         -1.         -1.        ]
 [-0.99776483 -1.         -1.         -1.        ]
 [ 1.          1.          1.          1.        ]
 [-1.         -1.         -1.         -1.        ]
 [-1.         -1.         -1.         -1.        ]]
y is:
[[0.04726184 0.0388356  0.10709375 0.19858864 0.10573868 0.19149445
  0.12689986 0.09414051 0.04798606 0.04196061]
 [0.0472978  0.03884879 0.10703134 0.19854977 0.10571044 0.19140426
  0.12704332 0.09410284 0.04801715 0.04199427]
 [0.08161828 0.1407313  0.05516205 0.05062813 0.11531234 0.02872439
  0.04733165 0.11753316 0.11081628 0.25214242]
 [0.04726184 0.0388356  0.10709375 0.19858864 0.10573868 0.19149445
```

```
  0.12689986 0.09414051 0.04798606 0.04196061]
 [0.04726184 0.0388356  0.10709375 0.19858864 0.10573868 0.19149445
  0.12689986 0.09414051 0.04798606 0.04196061]]
GT is:
[[-0.10735933 -0.01453745 -0.37291131 -0.74324378 -0.30737786 -0.73673541
   0.53763755  0.74121912  1.91894827 -0.91563981]
 [-0.10746505 -0.01462428 -0.37315055 -0.74368757 -0.30761414 -0.73716324
   0.53958876  0.74100879  1.91884094 -0.91573367]
 [-0.10746505 -0.01462428 -0.37315055 -0.74368757 -0.30761414 -0.73716324
   0.53958876  0.74100879  1.91884094 -0.91573367]
 [-0.10746505 -0.01462428 -0.37315055 -0.74368757 -0.30761414 -0.73716324
   0.53958876  0.74100879  1.91884094 -0.91573367]]
Your answer is:
[[-0.10735933 -0.01453745 -0.37291131 -0.74324378 -0.30737786 -0.73673541
   0.53763755  0.74121912  1.91894827 -0.91563981]
 [-0.10746505 -0.01462428 -0.37315055 -0.74368757 -0.30761414 -0.73716324
   0.53958876  0.74100879  1.91884094 -0.91573367]
 [-0.10746505 -0.01462428 -0.37315055 -0.74368757 -0.30761414 -0.73716324
   0.53958876  0.74100879  1.91884094 -0.91573367]
 [-0.10746505 -0.01462428 -0.37315055 -0.74368757 -0.30761414 -0.73716324
   0.53958876  0.74100879  1.91884094 -0.91573367]]
Input is:
[[  6  -8  -1  -4   5  -1  -2 -10  -1  -6   0   9  -1   2   4   1   7  -9
   -6   2   2   9  -8  -2  -1   0  -6  -4  -4   8   6  -8   6   7  -6   1
   -6   8   4   6   4   9  -7 -10  -4   2   0   6 -10   4  -3  -7   3  -1
    6   5   7   9  -6   5   7  -9   9   8]
 [  0  -1  -4  -5   9  -7   4   5   8 -10  -4  -8   3  -9  -9  -5 -10  -9
    5   4   1   1   2   4   7  -6   9   6   0   8   3  -2  -5   3   7   1
    8   5  -1   7 -10  -8   5   6  -5   9   0  -6   1  -4   9   3   6   1
    4   4   8 -10  -8   0  -2  -6  -2   6]
 [  0   5   4   1   7  -6  -2  -3  -5  -8   5   7   1   4   2  -2   8   0
   -9  -7   0   7  -3   7   1   0   1  -3  -6  -9   3 -10  -8   1  -1  -2
   -3   3   8  -3  -3  -5   2  -7   6 -10   9   7   0   1  -9   0  -1  -2
   -8  -6 -10  -1  -5   7 -10   5   7   6]
 [ -7   8  -2   8   0  -2  -2   2  -6   6   3   4   9   0  -9   6   3  -9
   -8   6  -6  -9   7  -8 -10   5   4   8  -6   6  -2  -7   9  -3  -2   4
    6  -4  -2 -10   8  -9   4  -8   7   5  -3  -6   2  -4   9   1   0   9
    6   2   0   2   6  -4   9  -3   4   9]
 [  0  -8  -5   3  -7  -1  -8   8  -5  -4 -10   4   3  -1   7  -1   9  -9
    6   5  -1   9   7   4   4   0  -1  -2   6  -4  -9  -2  -8  -1   4  -6
   -2  -3  -6  -6  -8   1   7   8   4   1  -1   3   6  -5   5   1  -4  -1
   -3  -6  -4   3  -4  -6   7   0   4  -1]]
label is:
[[0. 0. 0. 0. 0. 0. 0. 1. 0. 0.]
 [0. 1. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 1. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 1. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 1. 0. 0.]]
z is:
[[ 1.         -0.49435611  1.          1.        ]
 [-1.          1.          1.          1.        ]
 [-0.99361586 -1.         -1.         -1.        ]
```

```
 [ 1.          1.          1.          1.        ]
 [-1.         -1.         -1.         -0.99979054]]
y is:
[[0.27382843 0.09134099 0.06961779 0.0359327  0.08402948 0.06886951
  0.18823151 0.02575495 0.06311135 0.09928329]
 [0.1012974  0.15582522 0.10334072 0.09543504 0.11897028 0.10799989
  0.13145093 0.04415864 0.10015896 0.04136292]
 [0.05501912 0.0962908  0.12198731 0.08182037 0.07248995 0.05445706
  0.150354   0.06846969 0.24532846 0.05378324]
 [0.2101551  0.09972836 0.12672832 0.05589379 0.10029021 0.12215318
  0.12388403 0.04794897 0.03979135 0.07342668]
 [0.05485474 0.09636134 0.12180756 0.08190108 0.07247259 0.05440018
  0.15028066 0.06839573 0.24588245 0.05364366]]
GT is:
[[ 0.27316353  0.84320673 -0.1500107  -0.16680765 -0.08553449 -0.02548677
  -0.11901017 -0.10688302 -0.48690097  0.02426352]
 [ 0.06620989 -0.98225353 -0.04814181 -0.03015618  0.03275745  0.08724977
  -0.13835309  1.43686619 -0.38246009 -0.04171861]
 [ 0.47540707 -0.84575756  0.05589195  0.02354008  0.15832742  0.19016534
   0.14293182 -0.01900286 -0.28814926  0.10664599]
 [ 0.47541856 -0.84573738  0.05591747  0.02355724  0.1583426   0.19017674
   0.14296329 -0.01919799 -0.28809775  0.10665723]]
Your answer is:
[[ 0.27316353  0.84320673 -0.1500107  -0.16680765 -0.08553449 -0.02548677
  -0.11901017 -0.10688302 -0.48690097  0.02426352]
 [ 0.06620989 -0.98225353 -0.04814181 -0.03015618  0.03275745  0.08724977
  -0.13835309  1.43686619 -0.38246009 -0.04171861]
 [ 0.47540707 -0.84575756  0.05589195  0.02354008  0.15832742  0.19016534
   0.14293182 -0.01900286 -0.28814926  0.10664599]
 [ 0.47541856 -0.84573738  0.05591747  0.02355724  0.1583426   0.19017674
   0.14296329 -0.01919799 -0.28809775  0.10665723]]
Input is:
[[ -8  -6   2   0   1  -5  -4  -1  -8   7  -7  -9  -3   3  -8  -1  -8   8
   -7  -5 -10 -10   6  -3  -1  -1   1  -2  -5  -1   3  -7   9  -7 -10  -3
    4   5  -7  -4  -2  -3  -4  -6  -7  -2  -5  -6   8   2 -10   9   7  -9
   -8   2  -7   0   5  -9   2  -2  -4   5]
 [  8   2   0  -3  -4  -7 -10   5  -7  -1   2 -10   1  -2   0   5   2  -6
    2  -5   0   1   9   9   4   9   1  -1 -10  -4   0 -10  -7   7  -6   2
   -2  -6  -6  -3   8  -2  -8   5   5   1  -8   1   7  -2  -2   2 -10  -5
   -3  -4  -4  -6   3  -4   1  -6   9  -7]
 [  3   5  -1  -9  -3   8  -6  -6  -9   9  -3 -10  -7   6  -3   8  -7  -3
   -5   0   5   7   9   9   6  -3  -2  -4   8 -10   1  -3   0  -6   8   3
    5  -9  -5   7   0  -1   4  -4 -10  -3  -8  -2  -9   1   6   4   2   3
   -3  -7  -1  -8   8   5  -3 -10  -6 -10]
 [  8  -2 -10   8   1   9  -2   2 -10 -10   6   1   3  -1   8  -3   7   8
   -3  -9   5  -9   2  -2  -1 -10   0   5  -1   8  -4  -6   3   4   6  -6
   -2   0  -9   8   7  -6  -1  -6   5  -8  -4   0   4  -7   0   0   5 -10
   -5   7  -9   4  -9  -9   9   6  -8  -2]
 [  1   4   2 -10   3   5  -5   6  -1   5  -5  -6   1   1  -1   3  -9  -3
   -1   0   5 -10   7  -2   6  -8   6   2  -9   8  -8   3  -8  -2  -9  -3
    6   6  -2   0  -3   3  -3  -1   7   8  -6  -7   6   7   9  -3  -4   9
   -5   6  -6  -5  -4  -2   7  -4   5  -8]]
```

```
label is:
[[0. 0. 0. 0. 0. 0. 0. 0. 1. 0.]
 [0. 0. 0. 0. 1. 0. 0. 0. 0. 0.]
 [0. 1. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 1. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 1. 0. 0.]]
z is:
[[-1.         -1.         -1.         -1.        ]
 [-1.         -1.         -1.         -1.        ]
 [-1.         -0.99998886 -1.         -1.        ]
 [-1.         -1.         -1.          0.99999958]
 [-0.95153895  0.86715069 -0.53633728 -1.        ]]
y is:
[[0.12561863 0.01176854 0.19183234 0.16647185 0.16706107 0.05384254
  0.06761415 0.10075496 0.04132778 0.07370815]
 [0.12561863 0.01176854 0.19183234 0.16647185 0.16706107 0.05384254
  0.06761415 0.10075496 0.04132778 0.07370815]
 [0.12561837 0.0117686  0.19183173 0.16647293 0.16706061 0.05384291
  0.06761393 0.10075471 0.04132789 0.0737083 ]
 [0.0974372  0.02300354 0.38165386 0.04936639 0.06924363 0.03731166
  0.07189664 0.07491185 0.07048065 0.12469457]
 [0.07071981 0.02832224 0.07834663 0.35076511 0.08375953 0.12321802
  0.04057317 0.06102355 0.06333505 0.09993689]]
GT is:
[[-5.41585479e-01  9.14741073e-01 -3.17001317e-02 -8.82549691e-01
   3.49873160e-01 -3.16086393e-01 -3.13345827e-01  5.16296174e-01
   7.45270119e-01 -4.40913005e-01]
 [-4.12966687e-01  9.66239419e-01  1.10790201e-01 -2.44614962e-01
   5.02207616e-01 -9.19904579e-02 -2.39555078e-01 -1.19140943e+00
   8.60457378e-01 -2.59157999e-01]
 [-5.12222494e-01  9.26500513e-01  8.29517968e-04 -7.36911430e-01
   3.84650258e-01 -2.64926066e-01 -2.96499781e-01  1.26431585e-01
   7.71566937e-01 -3.99419041e-01]
 [-3.50138279e-01  9.59375620e-01 -1.27218891e+00 -8.00815382e-01
   4.84301320e-01 -2.47434354e-01 -1.71518794e-01  7.11623639e-01
   8.83162111e-01 -1.96366966e-01]]
Your answer is:
[[-5.41585479e-01  9.14741073e-01 -3.17001317e-02 -8.82549691e-01
   3.49873160e-01 -3.16086393e-01 -3.13345827e-01  5.16296174e-01
   7.45270119e-01 -4.40913005e-01]
 [-4.12966687e-01  9.66239419e-01  1.10790201e-01 -2.44614962e-01
   5.02207616e-01 -9.19904579e-02 -2.39555078e-01 -1.19140943e+00
   8.60457378e-01 -2.59157999e-01]
 [-5.12222494e-01  9.26500513e-01  8.29517968e-04 -7.36911430e-01
   3.84650258e-01 -2.64926066e-01 -2.96499781e-01  1.26431585e-01
   7.71566937e-01 -3.99419041e-01]
 [-3.50138279e-01  9.59375620e-01 -1.27218891e+00 -8.00815382e-01
   4.84301320e-01 -2.47434354e-01 -1.71518794e-01  7.11623639e-01
   8.83162111e-01 -1.96366966e-01]]
Input is:
[[  2  -8   7  -5  -4  -8   9   1  -5   4  -2   1  -1   0   5   9  -1   9
    0   6 -10  -7   4  -9   2   2  -1  -1  -3  -6  -5   3   1  -7   0   1
```

```
  -5   1 -5   8   2   3   2 -4   3   9 -6 -3   7   3 -9 -1   9 -1
   6   1   0 -2 -5   1   5   2 -5   8]
 [ -6   7   7 -9   0 -9 -6 -3 -1   4   5   4   3   8 -2 -4   9 -2
   6 -9   7   9   6 -1 -2   8   6 -2   5 -6   4   3   2   6 -10   2
 -10 -1   0   8   5   6   2 -3 -4   7 -6   4 -5   4   2   3 -4 -4
   6 -7 -9 -3   1 -9   4   1 -7   9]
 [  5   8   1 -4 -7   4   7   5 -5   9   4 -6 -6 -2 -8 -8 -8 -2
  -4   5   6 -5 -10 -5 -7 -3 -6   0   8 -3   2   8 -9   3   3   0
   1 -3   9 -10 -1   2 -2 -10   2 -2 -2   6 -1   4 -10 -9   9   5
  -5   3 -5 -5   3   0 -6 -8 -4   7]
 [ -7   3   8   7   1 -10   8   5 -4 -5 -6 -3   0   4   1 -10 -3 -8
  -1 -2   6 -10   2   6   9   8   6 -1   1   9   8 -6 -6   5 -3 -6
 -10 -2   3 -3 -9   1   9   5 -6 -3 -2   4 -2   8 -4   0   4 -3
  -4   6   3 -4   2   7 -2   9 -1   1]
 [  4 -2   1   5   5   3   1 -4 -8 -4 -6   6   8 -6   9 -6 -7 -3
   7   9   7   2 -10 -1 -8   4   3 -3 -6   8   8 -2 -5   1 -9   5
   6   6 -8 -10 -6 -3 -4 -8 -1   5 -8   7   8   7 -8   5   6 -2
   8 -6   1   6 -6 -9 -4 -1   9 -9]]
label is:
[[0. 0. 0. 0. 0. 1. 0. 0. 0. 0.]
 [0. 0. 0. 1. 0. 0. 0. 0. 0. 0.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 1. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 1. 0. 0. 0. 0. 0. 0.]]
z is:
[[-1.          1.         -0.99999999  1.        ]
 [ 1.          1.          1.          1.        ]
 [-1.         -1.         -1.         -1.        ]
 [ 1.         -0.9887857   1.          1.        ]
 [-1.         -1.         -0.37762386 -1.        ]]
y is:
[[0.04141477 0.10109243 0.0275874  0.0817453  0.23862457 0.13095757
  0.14427352 0.09995963 0.0861244  0.0482204 ]
 [0.0701681  0.13094234 0.1316332  0.21004495 0.03821123 0.07678015
  0.0561556  0.07929897 0.08693041 0.11983505]
 [0.08566563 0.12959855 0.0423335  0.03622235 0.17155405 0.1039899
  0.07447987 0.13504737 0.15602178 0.06508699]
 [0.03992119 0.13044428 0.25363771 0.12561201 0.03265753 0.05235836
  0.02701213 0.0680261  0.15250553 0.11782515]
 [0.10451699 0.14439106 0.05433982 0.03720846 0.12189993 0.09383084
  0.0690652  0.14475882 0.14511927 0.0848696 ]]
GT is:
[[ 0.87849189 -0.11369542  0.26101019 -0.81951914 -0.4612098   0.8003602
  -0.20465086 -0.23244076 -0.14782951  0.03948321]
 [ 0.88192674 -0.17093628 -0.18824607  1.08294178 -0.04890948 -1.04185422
   0.03017484 -0.16781083 -0.27888151 -0.09840497]
 [ 0.94354077 -0.02382987  0.29483    -1.41873762 -0.38534219  0.85875827
  -0.16166633 -0.14234632 -0.05751074  0.09230402]
 [ 0.96132143  0.08848944  0.31618498 -0.65602854  0.01603934 -0.93772465
   0.08389618 -0.03252149  0.0244193   0.135924  ]]
Your answer is:
[[ 0.87849189 -0.11369542  0.26101019 -0.81951914 -0.4612098   0.8003602
```

```
  -0.20465086 -0.23244076 -0.14782951  0.03948321]
 [ 0.88192674 -0.17093628 -0.18824607  1.08294178 -0.04890948 -1.04185422
   0.03017484 -0.16781083 -0.27888151 -0.09840497]
 [ 0.94354077 -0.02382987  0.29483    -1.41873762 -0.38534219  0.85875827
  -0.16166633 -0.14234632 -0.05751074  0.09230402]
 [ 0.96132143  0.08848944  0.31618498 -0.65602854  0.01603934 -0.93772465
   0.08389618 -0.03252149  0.0244193   0.135924  ]]
Input is:
[[  7   9   6  -4  -6   5  -4   0  -8  -4   2   4   7   6  -6 -10  -4   2
    1 -10  -2   7  -5  -5  -6  -8   9   4   6   5  -5  -6  -5  -5   2   6
    8   6  -6   2  -3  -3  -8   3   7   5  -2 -10   0   1   8   1  -3 -10
    1   0 -10   7  -4   8  -7   2   7   0]
 [ -8  -7  -3   4  -9   9  -2   3   1 -10   8   0  -2 -10  -7   3  -4  -9
   -4  -2  -9  -7  -6   0  -4  -3  -3  -7   2   9   1   8  -4   3   4   2
   -7   0   8  -2   0  -6   3  -5   9  -2  -3   4  -3  -8  -2 -10   5   0
    3   4  -8   6   7 -10  -2  -4  -1   8]
 [  4  -3  -6   7   9   5  -7   6  -6   0   4   7   0  -1  -6  -8   2   9
    3  -6   7   2   8  -3   2   2  -4  -2  -5  -3   3   8   2   3  -8   9
    2   0  -5   7   9  -7  -1  -6 -10  -3  -9  -8   5  -7  -5   3   6  -4
  -10   1   5  -1   4   1   9   3  -3 -10]
 [  2  -1  -1   9 -10   3  -6  -9   9  -1   5  -5   0  -6  -9  -3  -5   0
   -3 -10  -6  -6 -10  -6   4  -2   2  -5  -8  -6   1   0  -5   0   3  -4
   -5   5  -2   1   3   5  -8  -9   7   0   1  -3  -6   1  -4   2   3  -1
    5   3  -1  -3   6  -8  -5  -5  -2 -10]
 [  6   9  -1  -5   8  -1   0   9  -7   4 -10   9  -6   9   9   9   6   3
   -6  -6   0  -3  -9   7   3  -8 -10   1  -5  -7   7   2   1   0  -9  -7
    7  -8  -2   8  -9  -4  -4   8   1 -10   4   4   2  -9   6   0  -2  -4
    0   6   2  -9  -6   3   6  -4  -5   1]]
label is:
[[0. 1. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [0. 0. 0. 0. 0. 0. 0. 0. 1. 0.]
 [0. 0. 0. 1. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 1. 0. 0. 0. 0. 0.]]
z is:
[[ 1.         -1.         -0.99999136 -0.97942508]
 [-1.         -0.99999988 -1.         -1.        ]
 [ 0.99999377  0.99999999  0.99798126 -0.99997123]
 [-1.         -1.         -1.         -1.        ]
 [ 1.         -1.         -1.          0.99638543]]
y is:
[[0.26824304 0.14947373 0.07445326 0.14133887 0.02259093 0.04966645
  0.07628206 0.03178967 0.14267192 0.04349007]
 [0.17387427 0.08840841 0.07815665 0.08861083 0.05469144 0.07486319
  0.12442268 0.10924208 0.18126359 0.02646687]
 [0.04288101 0.07616855 0.17404937 0.15043665 0.04280096 0.02383102
  0.05858433 0.03390026 0.26126817 0.13607968]
 [0.17387427 0.08840841 0.07815665 0.08861083 0.05469143 0.07486319
  0.12442269 0.10924207 0.18126358 0.02646687]
 [0.38132093 0.2334317  0.03203508 0.07869383 0.03380931 0.05712571
  0.03284662 0.05193819 0.03826407 0.06053456]]
GT is:
```

```
[[ 0.34469617 -0.71774331  0.12422332  1.19324674 -1.01018193 -0.01910334
  -0.08113272 -0.10085624 -0.92031841  1.18716972]
 [-0.95443148  0.51644631 -0.08875226  0.7531823   0.87701786 -0.23268752
  -0.29938971 -0.26831173 -1.28219496  0.97912119]
 [-0.95451575  0.51628519 -0.08910299  0.75287982  0.87693164 -0.23273521
  -0.29950733 -0.26837991 -1.28070244  0.97884698]
 [-0.27340965  0.81263154 -0.37135975  0.61232456 -1.13700706 -0.16528205
  -0.34941268 -0.23176858  0.27457271  0.82871097]]
Your answer is:
[[ 0.34469617 -0.71774331  0.12422332  1.19324674 -1.01018193 -0.01910334
  -0.08113272 -0.10085624 -0.92031841  1.18716972]
 [-0.95443148  0.51644631 -0.08875226  0.7531823   0.87701786 -0.23268752
  -0.29938971 -0.26831173 -1.28219496  0.97912119]
 [-0.95451575  0.51628519 -0.08910299  0.75287982  0.87693164 -0.23273521
  -0.29950733 -0.26837991 -1.28070244  0.97884698]
 [-0.27340965  0.81263154 -0.37135975  0.61232456 -1.13700706 -0.16528205
  -0.34941268 -0.23176858  0.27457271  0.82871097]]
Input is:
[[ -8  -9   3   5  -1  -5   1   5   1  -3 -10  -4   6  -3   3  -9  -6  -9
  -10  -8  -6  -3  -5  -7  -9   2   6   3  -5   1  -3  -3   4   5  -6  -1
    6   4  -4  -4   1   4  -6   9   9  -2   0   2   4  -5   8   1   6  -7
   -8   2   7   0   2   2   3   4   9  -9]
 [  5  -1   3  -5  -6   6  -7   5  -6   0  -5 -10  -5  -6   9  -7   7   4
    7  -1 -10   2   4  -9  -9 -10   7   0  -3   9  -1  -9   9   1  -7   4
  -10   2   1   4   8  -1  -4   7 -10  -6   1 -10   1  -1  -6  -5   9  -6
    6   4   2   0  -3   8   3  -8  -2  -3]
 [  0   7  -8   3  -5  -6  -9  -2  -5  -6  -2   1   8  -7  -2  -9   0   0
    0   4   2  -9   0   9   0   5   1  -6  -3   4   2  -7   1   8  -1   8
   -5   3  -1   0  -6   7  -3  -8   8   3  -9  -8  -1  -8   4   6  -3   5
    5   8   3  -9  -9   9  -9   8   8  -2]
 [  2  -5  -7   4  -8  -5  -6  -1  -5   7  -8   3   7   9  -8   9   1   0
   -1   3   3  -6  -9   4  -7  -9  -3  -5   6   0   0  -6   6   2  -4  -9
    1  -1  -3   9  -2   0  -3   9   8  -7  -9  -7   5   9   3 -10   5   3
    6  -5  -5   6   0  -4  -7   8  -4  -4]
 [  7   3  -4   0  -4   1  -7   2   0  -2   3  -2  -7  -7   7   3  -3   9
    7  -8   0  -3   8  -8  -3  -2  -2  -9  -7  -4  -5  -9   7  -3  -8   7
   -6   3   1   1   8   1   3   8  -4   2  -2  -1   6   0  -6   1  -5  -2
    7   8  -9  -3  -6   4   7   5  -9   8]]
label is:
[[0. 0. 1. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 1. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 1. 0. 0. 0.]
 [0. 0. 0. 1. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 1. 0. 0. 0.]]
z is:
[[-1.         -0.99995722 -1.         -1.        ]
 [-1.         -1.         -1.         -1.        ]
 [-0.99999998 -1.         -1.         -1.        ]
 [-1.         -0.99999994 -1.         -1.        ]
 [-1.         -1.         -1.         -1.        ]]
y is:
[[0.1569313  0.10509392 0.06128538 0.08409722 0.10936448 0.06030735
```

```
  0.13201047 0.18773063 0.05888592 0.04429332]
 [0.15693397 0.1050945  0.06128498 0.08409619 0.10936358 0.06030669
  0.13200842 0.18773235 0.05888555 0.04429377]
 [0.15693397 0.1050945  0.06128498 0.08409619 0.10936358 0.06030669
  0.13200842 0.18773235 0.05888555 0.04429377]
 [0.15693397 0.1050945  0.06128498 0.08409619 0.10936358 0.06030669
  0.13200842 0.18773235 0.05888555 0.04429377]
 [0.15693397 0.1050945  0.06128498 0.08409619 0.10936358 0.06030669
  0.13200842 0.18773235 0.05888555 0.04429377]]
GT is:
[[-0.78466719 -0.52547194  0.69357469  0.57951802 -0.5468188   0.69846589
   1.33995584 -0.93866001 -0.29442812 -0.2214684 ]
 [-0.78466047 -0.52546744  0.69353454  0.57952156 -0.54681412  0.69846847
   1.33996152 -0.93865197 -0.2944256  -0.22146651]
 [-0.78466719 -0.52547194  0.69357469  0.57951802 -0.5468188   0.69846589
   1.33995586 -0.93866001 -0.29442812 -0.2214684 ]
 [-0.78466719 -0.52547194  0.69357469  0.57951802 -0.5468188   0.69846589
   1.33995586 -0.93866001 -0.29442812 -0.2214684 ]]
Your answer is:
[[-0.78466719 -0.52547194  0.69357469  0.57951802 -0.5468188   0.69846589
   1.33995584 -0.93866001 -0.29442812 -0.2214684 ]
 [-0.78466047 -0.52546744  0.69353454  0.57952156 -0.54681412  0.69846847
   1.33996152 -0.93865197 -0.2944256  -0.22146651]
 [-0.78466719 -0.52547194  0.69357469  0.57951802 -0.5468188   0.69846589
   1.33995586 -0.93866001 -0.29442812 -0.2214684 ]
 [-0.78466719 -0.52547194  0.69357469  0.57951802 -0.5468188   0.69846589
   1.33995586 -0.93866001 -0.29442812 -0.2214684 ]]
Input is:
[[ -8  -1   4   7   4  -2  -2   1   1  -8   2   1   2   7   0   4   6   6
    2   7   0   7   6 -10   1   8  -8  -1  -7   3   1   5   4   1 -10  -6
    9  -1  -4   4   8   9   9  -4   7   4 -10  -9  -3   3   6  -8   9   5
    3  -6  -2   6   5   1  -9   1  -4   2]
 [ -1   7   3  -4   5   4  -7   8  -8  -6   1  -5  -7   2   4  -2  -5   6
  -10  -8  -2   0   9  -2   2   4  -3  -1  -6  -9  -3  -1  -9   3  -9   3
   -7  -8   9   8   1  -7   9   2  -8  -3   6  -1  -2   8  -9  -6  -4  -5
    7  -9   7  -6  -3   0  -5  -8   9   3]
 [  9 -10   8  -9  -1   5  -2   0  -5  -7   5   6  -9   8   2  -6   7  -4
    7  -9   1   4   6  -6  -6  -6 -10  -6  -5   0  -4   2   7   5   1  -8
    7  -3  -3   6  -1  -4  -7  -1   5   5   7  -9   4   2  -7  -1   3   2
    9  -7   2  -7   0   6  -8  -2   6   1]
 [ -7  -2  -1  -4  -2   9   9  -9   5   4  -5 -10  -6   4   6  -3   9  -2
   -6   3   7   7   9 -10   5  -9  -6   8   9  -7   8   4   2  -3   1   1
    5   2  -9   6   5   1   4 -10   9  -7  -2  -2   3   5  -4   9  -6  -5
   -1   7  -7   1  -2  -7  -7  -8  -9   4]
 [ -9   4  -8  -9  -4  -5  -9  -9   4  -3  -9  -7   3   5  -6  -5   5   7
   -1  -2   3  -5 -10 -10  -1   6  -3   0   4   8   8  -4   8   2  -2  -1
    6 -10  -1 -10   2  -1   2   7   3   8   2 -10   9  -7   2 -10  -6   1
    2  -8  -6  -6   8  -5 -10  -8   8  -4]]
label is:
[[0. 0. 0. 1. 0. 0. 0. 0. 0. 0.]
 [0. 1. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 1. 0.]
```

```
 [0. 0. 0. 1. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 1. 0. 0. 0.]]
z is:
[[ 1.          1.          1.          1.        ]
 [-1.         -1.         -1.         -1.        ]
 [ 0.52494063 -0.99999984 -1.         -1.        ]
 [-0.99788364 -0.99993277  1.         -1.        ]
 [-1.         -1.         -1.         -1.        ]]
y is:
[[0.06854541 0.18940492 0.14671956 0.02748776 0.17970672 0.15199016
  0.0772729  0.01942079 0.11581972 0.02363207]
 [0.04247542 0.05910096 0.09120195 0.16689857 0.03646864 0.06453542
  0.08274162 0.19462884 0.14632205 0.11562653]
 [0.05977768 0.12760397 0.05608398 0.17712749 0.06081492 0.08787281
  0.07657678 0.10092793 0.09739215 0.15582229]
 [0.01502723 0.05983243 0.09589692 0.08669492 0.07788825 0.07433744
  0.16357009 0.09144184 0.27993164 0.05537924]
 [0.04247542 0.05910096 0.09120195 0.16689857 0.03646864 0.06453542
  0.08274162 0.19462884 0.14632205 0.11562653]]
GT is:
[[-2.11338354e-05  1.07848171e+00 -1.01937561e-01 -3.01955773e-01
   6.09702558e-02 -5.13278526e-03  7.88764005e-01 -4.08104036e-01
  -9.29979110e-01 -1.81085572e-01]
 [-9.12093260e-02  8.83770646e-01 -1.87658797e-01 -5.70193165e-01
  -3.19284869e-02 -1.39285909e-01  6.71653792e-01 -5.62200490e-01
   4.45870506e-01 -4.18818769e-01]
 [-6.11558826e-02  1.00343146e+00  4.12859456e-03 -2.39674195e+00
   1.23842768e-01  9.38395172e-03  9.98782972e-01 -3.79322980e-01
   1.00571511e+00 -3.08064041e-01]
 [-9.12103456e-02  8.83766603e-01 -1.87665253e-01 -5.70131791e-01
  -3.19337328e-02 -1.39290921e-01  6.71642784e-01 -5.62206654e-01
   4.45851827e-01 -4.18822517e-01]]
Your answer is:
[[-2.11338354e-05  1.07848171e+00 -1.01937561e-01 -3.01955773e-01
   6.09702558e-02 -5.13278526e-03  7.88764005e-01 -4.08104036e-01
  -9.29979110e-01 -1.81085572e-01]
 [-9.12093260e-02  8.83770646e-01 -1.87658797e-01 -5.70193165e-01
  -3.19284869e-02 -1.39285909e-01  6.71653792e-01 -5.62200490e-01
   4.45870506e-01 -4.18818769e-01]
 [-6.11558826e-02  1.00343146e+00  4.12859456e-03 -2.39674195e+00
   1.23842768e-01  9.38395172e-03  9.98782972e-01 -3.79322980e-01
   1.00571511e+00 -3.08064041e-01]
 [-9.12103456e-02  8.83766603e-01 -1.87665253e-01 -5.70131791e-01
  -3.19337328e-02 -1.39290921e-01  6.71642784e-01 -5.62206654e-01
   4.45851827e-01 -4.18822517e-01]]
Input is:
[[ 5  2  5  3  8 -4 -8  5  9 -9  1 -10  2  5  3  6  3  5
  -3  7 -3  1 -4 -9 -8  4  4  1  2  4  7 -10  1  3  7  3
  -2  2  0 -7 -1 -2  5  8 -1 -5 -2  3  4  1 -7  9 -9 -3
   1  6  9  5  3 -6 -8  4  3  6]
 [ 4 -2  0 -9  3 -8 -10  9 -5  2 -1 -7 -7 -9  4 -4  3  0
   8  8 -1 -4 -8  4 -10 -2  4 -9 -8  1  8 -7 -1 -10 -2  1
```

```
   4 -5  8  2  6 -5  4 -2  3  2 -2 -3  5  7 -7 -5 -9 -9
  -2  6  1  5 -4  5 -1 -2 -7  2]
 [  0  0  9  1 -9  6 -7 -3  7 -7 -4  7  9 -5 -3  8 -2 -4
   9 -10  7 -8 -3  2  9 -8  9  2  6 -6 -9 -2  8 -4  4  6
   4  0 -5  9  3 -8  8  4  4  1 -9 -8 -1  4 -9  4 -8  2
   6  2 -7  2  3  0  3  5  4 -1]
 [  0  9 -9 -1 -5 -6  0  4 -6  0  0  6 -1 -4 -2  8  3  0
   5  1 -9 -9 -7 -7  5 -5  4 -10  7  6 -9  7 -10 -2 -4 -3
  -6 -7  0 -6  3 -3 -2  2  7  4  5 -2  7 -4 -2 -7 -5 -2
   3  0  6  9 -2  2 -1  3  8  5]
 [  0  4  4 -4 -6  8 -5 -7 -9 -1 -4 -4 -6  2 -5  4  5 -5
   3  3 -8  5  1 -6  4  4  7 -8 -9 -4 -6 -6  8 -5  1 -7
   1 -10  7  3 -1  0  9 -5 -6  8  1 -3 -3 -6 -1  1 -3  8
  -8 -4  4 -9 -7 -5  9 -10 -3  5]]
label is:
[[0. 0. 0. 0. 0. 0. 0. 0. 1. 0.]
 [0. 0. 0. 1. 0. 0. 0. 0. 0. 0.]
 [0. 1. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 1. 0. 0. 0.]
 [0. 0. 1. 0. 0. 0. 0. 0. 0. 0.]]
z is:
[[ 1.          1.          1.          1.        ]
 [-1.         -1.         -1.         -1.        ]
 [ 0.95409273  0.99993404  1.          1.        ]
 [-1.         -1.         -1.         -1.        ]
 [-1.         -1.         -1.         -1.        ]]
y is:
[[0.0414688  0.02504636 0.11224609 0.06275937 0.19471862 0.08205727
  0.17335798 0.07651182 0.13439031 0.09744337]
 [0.08568759 0.12704607 0.13509556 0.06390095 0.02631388 0.17124772
  0.04208916 0.1174364  0.06848908 0.1626936 ]
 [0.04183357 0.02539793 0.11407195 0.06331314 0.19107194 0.08320527
  0.1738115  0.07742945 0.13189396 0.09797128]
 [0.08568759 0.12704607 0.13509556 0.06390095 0.02631388 0.17124772
  0.04208916 0.1174364  0.06848908 0.1626936 ]
 [0.08568759 0.12704607 0.13509556 0.06390095 0.02631388 0.17124772
  0.04208916 0.1174364  0.06848908 0.1626936 ]]
GT is:
[[-0.17568086 -1.2859526   0.81579464  0.93146312  0.29807734 -0.35230035
   1.2129228  -0.20192251 -0.94523785 -0.29716373]
 [-0.17376316 -1.33062963  0.82102385  0.93436548  0.30683633 -0.34848612
   1.22089055 -0.19837305 -0.93919166 -0.2926726 ]
 [-0.1737604  -1.33069391  0.82103137  0.93436965  0.30684893 -0.34848063
   1.22090201 -0.19836794 -0.93918296 -0.29266614]
 [-0.1737604  -1.33069391  0.82103137  0.93436965  0.30684893 -0.34848063
   1.22090201 -0.19836794 -0.93918296 -0.29266614]]
Your answer is:
[[-0.17568086 -1.2859526   0.81579464  0.93146312  0.29807734 -0.35230035
   1.2129228  -0.20192251 -0.94523785 -0.29716373]
 [-0.17376316 -1.33062963  0.82102385  0.93436548  0.30683633 -0.34848612
   1.22089055 -0.19837305 -0.93919166 -0.2926726 ]
 [-0.1737604  -1.33069391  0.82103137  0.93436965  0.30684893 -0.34848063
```

```
   1.22090201 -0.19836794 -0.93918296 -0.29266614]
 [-0.1737604  -1.33069391  0.82103137  0.93436965  0.30684893 -0.34848063
   1.22090201 -0.19836794 -0.93918296 -0.29266614]]
Input is:
[[ -3   0  -9  -4   3  -5   6   0   6   9  -1  -5  -9   6  -7  -4  -8  -4
    5   6  -9  -1   4  -9  -6  -1   4   9  -2   4 -10   8   3  -1  -6  -8
    5 -10   1  -5   9   2  -9  -8  -9   0   6  -9   8   5  -5   9   9  -6
   -8   1   8   6  -6  -5  -6   1   2   0]
 [ -7  -6   9  -5  -4  -6  -3   4  -5   6   3  -9   6   5  -4   2  -3  -1
    3   1   6   6  -6  -7 -10  -7   8   7 -10  -7  -7   2  -9  -1  -5  -6
   -6   2  -7  -9   8   9  -8   6   8  -4  -7  -6  -3   0  -5  -7   7  -1
   -2   7   1 -10  -7  -6   1  -9   7   3]
 [  3  -5   9   0  -6   9  -8  -3   0   6   9  -8   6  -4  -4   1  -5  -3
   -2   8   6   4  -1  -4  -5   4   2   6   3   4   2   6  -4   5  -8  -3
  -10   2  -1 -10   8   4  -6   0  -6   8   7   5   6  -9  -7   5  -7   2
   -8  -1   0  -7   2  -3   7  -7   0   4]
 [ -7   4   7  -8   2   6  -1   6  -8   0  -3  -3   4   7  -2   3  -1   3
   -5  -2   9  -9   7   0   9  -7   3   1   2  -9   8   7   9  -2   9   6
   -4  -2   2 -10  -9 -10  -7  -6   3  -9  -7  -4  -1   4   7  -8  -7  -4
    6 -10   8   2  -7  -8  -8   9   3  -1]
 [ -1   7   2  -6  -5   2  -9   4  -1  -6   7   9  -8   6   5   7   9   0
    7   4  -7   6   2   1   0  -6  -5  -7  -2  -8  -6   9  -9   8   4   4
    0  -5  -5   5  -4  -8   1  -9   3  -6   5  -8   0  -7  -5  -3   8  -3
   -3   2 -10   8  -7  -8  -7  -1  -1   6]]
label is:
[[0. 0. 1. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 1. 0.]
 [0. 1. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 1. 0. 0. 0. 0. 0. 0.]
 [0. 0. 1. 0. 0. 0. 0. 0. 0. 0.]]
z is:
[[-0.99999978 -1.         -1.         -1.        ]
 [-1.         -1.         -1.         -1.        ]
 [ 0.99624388 -1.         -0.99999687  0.61924314]
 [-1.         -1.         -1.         -1.        ]
 [-1.         -1.         -1.         -1.        ]]
y is:
[[0.08201895 0.09503352 0.13390486 0.0597722  0.07404303 0.06512813
  0.10312614 0.15578405 0.03950069 0.19168842]
 [0.08201895 0.09503352 0.13390486 0.0597722  0.07404303 0.06512812
  0.10312614 0.15578406 0.03950069 0.19168841]
 [0.15409013 0.10078627 0.04355053 0.08548555 0.04661705 0.16625474
  0.10123433 0.06359711 0.1044437  0.13394059]
 [0.08201895 0.09503352 0.13390486 0.0597722  0.07404303 0.06512812
  0.10312614 0.15578406 0.03950069 0.19168841]
 [0.08201895 0.09503352 0.13390486 0.0597722  0.07404303 0.06512812
  0.10312614 0.15578406 0.03950069 0.19168841]]
GT is:
[[-0.17456444 -1.27597023  1.50776732  0.84607565 -0.24973016 -0.09488221
  -0.31165047 -0.55977797  0.94604864 -0.63331612]
 [-0.48216593  0.51907966  1.42083002  0.67542564 -0.34278918 -0.42676723
  -0.5137389  -0.68673335  0.73755353 -0.90069425]
```

```
 [-0.48216545  0.51907685  1.42083016  0.67542591 -0.34278904 -0.42676671
  -0.51373859 -0.68673315  0.73755386 -0.90069384]
 [-0.23265655 -0.93696601  1.49134892  0.81384752 -0.26730484 -0.15756039
  -0.34981591 -0.58375416  0.90667328 -0.68381187]]
Your answer is:
[[-0.17456444 -1.27597023  1.50776732  0.84607565 -0.24973016 -0.09488221
  -0.31165047 -0.55977797  0.94604864 -0.63331612]
 [-0.48216593  0.51907966  1.42083002  0.67542564 -0.34278918 -0.42676723
  -0.5137389  -0.68673335  0.73755353 -0.90069425]
 [-0.48216545  0.51907685  1.42083016  0.67542591 -0.34278904 -0.42676671
  -0.51373859 -0.68673315  0.73755386 -0.90069384]
 [-0.23265655 -0.93696601  1.49134892  0.81384752 -0.26730484 -0.15756039
  -0.34981591 -0.58375416  0.90667328 -0.68381187]]
```

test_dEdv0 (test_MLP.TestMLP) (3/3)

ten tests for dEdv0() with random weights and inputs
Input is:
[[-1 -4 -2 -8   9   0 -9   4   3 -6 -2   7 -9   1   6   2 -10 -4
    0 -10   2 -7   0 -2 -4 -4   6 -2 -1 -3   7   7   2 -7   8   2
    9 -8 -1   8 -5 -6 -5 -8   4   1   7   9   9 -10   7 -7   8   3
   -1 -3   6   8 -6 -3   0 -8 -7 -3]
 [-5   7   3 -2   0   1 -5   7 -1 -2 -7   8 -4 -7   3   1 -1   4
    9 -8   3   3   5   0 -5 -10   6 -5   3 -2   3   3 -1   7   0 -2
   -6   1   8   5 -1 -3   2   3   5 -1 -2   8 -3 -6   1 -2 -3 -4
    8   9 -2   6 -9   7   1   1 -9   8]
 [-6   4 -9   8 -7 -3   2 -1 -1   5   0   1   4 -4   0 -10   0 -3
   -3   7 -2   2   8 -6 -1 -3 -3 -3   1 -9 -6   7 -3   3 -8 -1
   -7 -10   2 -9 -3 -2   0 -2 -9   9 -10 -6 -5 -5 -4 -6 -8   8
    7   8 -3 -10   6   7 -9 -6   8   6]
 [2   6   2   0   0 -10   1 -8 -3 -8   6 -8   7 -5   8 -3   4   6
   -1   0 -2 -10 -9   7   7   7   5 -6 -7   9   5   6   9 -3 -4 -10
   -5 -3 -10 -1   0   0   3   9 -2   0 -4   7   4   7   2   5 -9 -9
    7   4 -8 -10   1   2   0   6   5 -9]
 [9   5 -2 -5 -6 -9   9   6 -10   0 -5 -4 -3 -3 -7 -6 -8 -8
   -7 -5 -4 -7   2   8 -9 -1   2   4   7 -5 -1   9   9   9   6   4
    4 -9 -9   2   8 -3 -4   4   6 -2   7   5 -7 -7 -9   9 -6 -6
   -4 -6   1   9 -2   4 -1   8   4 -7]]
label is:
[[0. 0. 0. 0. 1. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 1. 0.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 1. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 1. 0. 0. 0. 0. 0.]]
y is:
[[0.06166647 0.02709764 0.22887025 0.04721717 0.02233728 0.07277006
  0.0516755 0.06968641 0.24301262 0.17566661]
 [0.08625549 0.11832148 0.0677993 0.09703388 0.15800697 0.06681079
  0.08412904 0.17364763 0.07181542 0.07618001]
 [0.06166647 0.02709764 0.22887025 0.04721717 0.02233728 0.07277006
  0.0516755 0.06968641 0.24301262 0.17566661]
 [0.04698237 0.03415673 0.18879973 0.05781981 0.05477645 0.08482541
  0.12148831 0.09692131 0.16497259 0.14925729]
 [0.06166647 0.02709764 0.22887025 0.04721717 0.02233728 0.07277006
  0.0516755 0.06968641 0.24301262 0.17566661]]
GT is:
[[-0.68176273 0.23377112 0.94320977 0.29650521 -2.72020473 0.36994637
   0.36064385 0.47962817 -0.03417414 0.75243712]]
Your answer is:
[[-0.68176273 0.23377112 0.94320977 0.29650521 -2.72020473 0.36994637
   0.36064385 0.47962817 -0.03417414 0.75243712]]
Input is:
[[0 -5 -7 -4 -6   1   0   5   8   3 -9   3   6 -7   6 -9   8 -9
   -1 -9   3   6 -6 -1 -7 -10   7   8   2 -1 -6   3   3 -2 -6 -7
    2   2   7 -9 -2 -7   1 -5   6 -6 -6 -10   2   6 -9 -9   7 -6
   -4   6 -2 -6   8 -3   6 -4   0   4]
 [2   8 -2 -2 -3 -5   7 -5   0   0   9 -10   3 -4 -3   2 -9 -4
   -4 -9   3 -4   6 -10 -1 -2 -7   9 -10   9 -10   6   8   3   2   6

```
  -5  -4 -10   1  -1   4   3  -4  -3   4  -4  -4  -4   1   4   8  -1   8
   5   6   4   7   9 -10   0  -5  -1 -10]
 [  3  -6  -3   4   6   3   8  -9   9   5  -7  -1   2   1  -4   1  -8 -10
   0  -7   8   5  -5 -10  -6   9   0  -9  -8   7 -10   1   3   6 -10 -10
   6  -2   4   3  -3  -4   0   1   0  -9   4  -6   3   2   0   0  -5   2
   4   6  -8  -6  -1  -2   2 -10  -2   3]
 [  2   3   9   9   6  -9   9   9  -5  -8  -2  -8  -5  -6  -7 -10  -1  -3
   5  -7   0   8   2   3  -2  -6  -7  -2   0   9   6   7  -4   2   1   3
   6   9   1   1  -2  -6  -8  -5  -1  -8   4   9   8   1   4  -2  -3  -3
  -6   3   0  -5   8   6  -9   6  -7   5]
 [-10  -8   9   8   9  -2  -8   3  -8   6   2 -10   8  -1   0   8  -5  -5
  -7   0  -8   0 -10   4  -8   6  -7   8 -10 -10  -6  -3  -9   0   4  -4
   2  -5   6   1   0  -1  -7  -2  -1   8  -3   3   8  -4  -9  -3   0  -3
   5  -1  -3   0   7  -4   9   5   7   0]]
label is:
[[1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 1. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 1. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 1. 0. 0. 0. 0. 0. 0.]
 [0. 1. 0. 0. 0. 0. 0. 0. 0. 0.]]
y is:
[[0.23646114 0.07662711 0.03121541 0.12020282 0.09800779 0.10768848
  0.04259658 0.07353194 0.11888244 0.09478629]
 [0.08817028 0.05454908 0.03283269 0.1791542  0.12444488 0.20178242
  0.07325914 0.06949978 0.06557953 0.11072799]
 [0.23646114 0.07662711 0.03121541 0.12020282 0.09800779 0.10768848
  0.04259658 0.07353194 0.11888244 0.09478629]
 [0.1711697  0.11032606 0.04197033 0.07755334 0.04371548 0.06475313
  0.10732305 0.04558773 0.19910756 0.13849361]
 [0.23646114 0.07662711 0.03121541 0.12020282 0.09800779 0.10768848
  0.04259658 0.07353194 0.11888244 0.09478629]]
GT is:
[[-0.03127659 -1.60524354 -0.83155074 -0.382684    0.46218375  0.58960099
   0.30837192  0.33568334  0.62133442  0.53358045]]
Your answer is:
[[-0.03127659 -1.60524354 -0.83155074 -0.382684    0.46218375  0.58960099
   0.30837192  0.33568334  0.62133442  0.53358045]]
Input is:
[[  8   3   8   5  -7  -1   8   5  -3  -2   3  -6   9   4   0  -9   2  -9
    0 -10  -8  -1 -10   2   6   9  -8  -5   7   2   1   6  -9   2  -7  -2
    7   2  -8  -9  -9   7  -7   3   9  -2  -6  -5  -5   5   1 -10  -1  -3
   -8  -9   3  -5  -2   4   7   6  -2  -5]
 [  3  -1   1   1  -8  -3   7   3   7  -9   9 -10   5   8  -4   4 -10  -5
    3   2  -1   6   2   5  -5   4  -8  -1   0   4   5   5   5 -10   2 -10
    9  -6   9   5  -4  -7  -4   2  -8  -2   4  -2  -8   7  -4  -4 -10   8
    5  -3   7 -10   0   0  -2   2   3   7]
 [ -6  -2  -6   7   3  -6 -10   9   5  -1   0   7  -4   7   8  -1   0   0
    3   0  -5  -7  -7  -3  -1  -4   6   2  -9   6  -2  -3  -5   3  -9  -8
    5   5   2   3  -8   4   6   5   4   7   0   3 -10   7  -3   4   8   8
   -3   8 -10   8   4   3  -5  -8 -10  -7]
 [ -4  -9 -10  -5   7  -3   4   9  -2  -5  -7 -10  -2  -9  -1  -2   2 -10
    5   7   2  -9  -9 -10 -10   7  -9   8  -1   3 -10   9   2   5   5  -6
```

```
  -8 -7  2  1 -9 -7 -9 -6  9  3 -7 -8  2 -9 -7  9  7 -9
  -8 -2  8  6  3  8  3 -9  2  6]
 [ -6 -3  2 -5  4 -3 -9 -7  2 -5  3  6  0  1 -7 -7 -4 -8
  -4 -9  1 -8 -4 -9 -7  3  8 -9  0  3 -4 -2  4  8  3 -7
 -10 -7 -5 -1  0 -3  0 -4 -9  3  0  4  7 -8  2  3  8  5
 -10 -9  2 -10  7  9 -3  4 -9 -2]]
label is:
[[1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 1. 0.]
 [0. 1. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [0. 1. 0. 0. 0. 0. 0. 0. 0. 0.]]
y is:
[[0.03077664 0.08692633 0.13968606 0.06844501 0.26197449 0.08306507
  0.16933581 0.0491196  0.03538749 0.07528349]
 [0.02041944 0.08877993 0.12288137 0.09128866 0.19010815 0.06317012
  0.10660971 0.19188412 0.06953725 0.05532127]
 [0.19071059 0.18690666 0.02791823 0.10259325 0.08197641 0.07833815
  0.06853402 0.02270704 0.09056639 0.14974925]
 [0.03077648 0.08692592 0.13968641 0.06844475 0.26197418 0.08306501
  0.16933645 0.04911973 0.03538739 0.07528367]
 [0.03077648 0.08692592 0.13968641 0.06844475 0.26197418 0.08306501
  0.16933645 0.04911973 0.03538739 0.07528367]]
GT is:
[[-0.69654036 -1.46353524  0.56985848  0.39921643  1.05800741  0.39070336
   0.68315245  0.36195022 -0.7337341  -0.56907864]]
Your answer is:
[[-0.69654036 -1.46353524  0.56985848  0.39921643  1.05800741  0.39070336
   0.68315245  0.36195022 -0.7337341  -0.56907864]]
Input is:
[[ -2  4  7  6  9 -1  2 -6 -1  0 -3 -3 -7 -4 -1 -1  5  1
   8  8  2  5 -4  0 -5  9  3  3 -10 -2  0 -5  2  0 -1 -10
   6 -5  6 -7 -8 -6 -5 -4  3  1  5 -10  2  8 -8  4  7 -8
   8 -7 -1  0  3  3 -7  3 -4 -3]
 [ -6 -4 -5  6  4 -1  4  7 -3 -4 -6  7  0  4 -6  3 -10 -2
   1 -5 -9 -1 -8  9  7 -7 -2 -4  0  3  3 -4 -5 -8  7  2
   9 -5 -5 -8 -7  5  2  0 -2 -4 -1 -6  6 -10  3  8 -1  1
  -7 -6  3  6  6  4 -1 -4 -4 -2]
 [  4 -4  9  4 -7 -10  2  6 -8 -1 -6 -7 -9  0  7  0  5  1
  -6  4 -2  1  8 -3  2 -9  0 -2 -1  5  3 -2 -5  8 -1  8
   3  2 -2 -7  1  8 -6  2 -3  6  5  7  5 -1  5  2 -6  0
   2  9  8 -4 -6  9  6  1  1 -2]
 [  1  9  8 -3 -8 -2 -5  2 -10  6  8  8  1 -4  1  1  4 -6
  -4 -3 -5 -2  9 -1 -8 -4 -3  9 -4 -6  4  9  2  9  7 -1
  -6 -6 -3 -9 -10  8 -9 -4 -9 -8  5  3 -9  2  8 -9  0  5
  -7 -1  0  1  3 -8  8  9  3  1]
 [  5  1  9  5 -7 -6  0  5 -9  4  6 -9  2  2 -8 -3 -8 -8
   6  6 -2  1 -10  4  0 -10  9 -10  2 -7 -9 -7 -1 -8 -7 -9
   2  4  2  3 -2 -7 -9  0  9 -5 -9 -2  7 -9 -6  7  4  0
   2  0  6  3 -3  1  9  0 -3  3]]
label is:
[[1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
```

```
 [0. 0. 0. 0. 1. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 1. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 1. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 1. 0. 0.]]
y is:
[[0.10956152 0.02895109 0.03314584 0.21660265 0.05621112 0.0636025
  0.06484123 0.05135865 0.08061318 0.29511221]
 [0.05023651 0.12409019 0.10074677 0.13748941 0.07201686 0.09747646
  0.10707468 0.05680388 0.17130995 0.0827553 ]
 [0.09869794 0.06115556 0.04800084 0.11289937 0.08301014 0.12325007
  0.04815817 0.11600052 0.04664008 0.26218733]
 [0.03785483 0.12507843 0.125346   0.1403955  0.06634944 0.11805878
  0.10705122 0.05564744 0.1661031  0.05811529]
 [0.05023651 0.12409019 0.10074677 0.13748941 0.07201686 0.09747646
  0.10707468 0.05680388 0.17130995 0.0827553 ]]
GT is:
[[-0.6534127   0.46336546  0.40798622  0.74487633 -2.65039558  0.49986427
   0.43419996 -0.66338564  0.63597625  0.78092543]]
Your answer is:
[[-0.6534127   0.46336546  0.40798622  0.74487633 -2.65039558  0.49986427
   0.43419996 -0.66338564  0.63597625  0.78092543]]
Input is:
[[ -7 -10   1  -1   8  -8  -8   7   8   6   3   9   4   8   4   2 -10  -9
    9   0   0   2  -9   2   0   1   0  -9   1   2   0  -6  -4   4   1   2
   -4  -7   1   5 -10   7  -7   3 -10  -1   7 -10  -6   6   6   9   0   4
    4  -9  -8  -1   5  -2  -4 -10  -4  -3]
 [ -6   5   1  -7  -6  -8  -1   7   6   2  -9 -10  -3 -10  -3  -3   7  -7
    1  -4  -5   2   4  -8   1  -9   3 -10   2   8  -4  -7   5  -6  -7   4
   -3  -1   4   7 -10  -5 -10  -2  -8  -4   9   1   3  -6   0  -8  -1 -10
    7   4   0   2   8  -9  -4  -7  -1  -6]
 [  9 -10   3  -3  -7  -5  -9  -6  -4  -8   9   5  -6   7  -7   6   1   2
   -9  -6   4  -2   5   5  -2   8   5   3   6  -1 -10   4  -3  -6   0  -6
    3   0  -2  -4  -2  -6  -1   5  -4   4   3   7   4   7  -2  -9  -8   1
    7  -8   5  -3  -3   9  -7   8   4  -7]
 [  6  -5  -1 -10 -10  -6  -4   7  -8  -2   5  -3  -8  -4  -5  -4  -1  -8
    4  -6   0   2  -6   3  -5   5   7   9   7 -10   0  -9   4 -10   7   3
  -10   5   9  -6  -6   4   3   4   5   8   2  -5   0   4  -8   9  -5  -4
    2  -6   1   0   5   9   5   1   6   9]
 [ -2   0  -5  -4  -3  -8   6  -7  -3   1   2  -7  -9   4  -1  -7   4   4
    2   3   5   8   7   3   7  -7  -7   8   4   8   7   6   3   8   8  -9
   -1   1  -8  -6   6  -2   2  -2  -8   2   3  -3  -8   9   5  -7  -4  -1
    6   3  -7   0   4  -8   8  -9  -4   6]]
label is:
[[1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 1. 0. 0. 0.]
 [0. 0. 0. 1. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 1. 0. 0. 0. 0. 0.]
 [0. 1. 0. 0. 0. 0. 0. 0. 0. 0.]]
y is:
[[0.09993263 0.0553722  0.09467703 0.09875787 0.06333575 0.07986965
  0.1949977  0.13187773 0.06220929 0.11897016]
 [0.05616213 0.0782956  0.13761442 0.11740102 0.05558781 0.03721444
```

```
 0.06448522 0.22177011 0.12527371 0.10619553]
[0.06743922 0.07723884 0.06253867 0.10986064 0.04033789 0.04609963
 0.17540395 0.09315411 0.2826511  0.04527595]
[0.05663909 0.07654367 0.14441318 0.11613995 0.05718126 0.03640708
 0.06238668 0.22200064 0.12079158 0.10749688]
[0.22708625 0.05207798 0.22289486 0.09307853 0.08748419 0.08550852
 0.0667501  0.046049   0.04424322 0.07482736]]
GT is:
[[-0.49274068 -0.66047171  0.66213816 -0.46476199 -0.6960731   0.28509932
  -0.43597636  0.71485159  0.63516889  0.45276589]]
Your answer is:
[[-0.49274068 -0.66047171  0.66213816 -0.46476199 -0.6960731   0.28509932
  -0.43597636  0.71485159  0.63516889  0.45276589]]
Input is:
[[ -7  -9  -7   1 -10  -3  -2   3   6  -5  -8  -2  -8  -2  -7   7  -8   3
    6  -5  -8   7   4  -5 -10   1  -9  -8  -6 -10   2  -8 -10   2  -1  -6
    2  -6   4  -2   1   8  -2   2   5   0   9   7   6   8   4   2 -10  -5
    9  -9   0  -9  -7  -8  -3  -8  -5  -5]
 [-10  -8  -4  -1  -6   4  -1   1   8   6   0   9   5  -1  -2  -4  -8  -6
    2  -1  -5   4  -4  -6  -7   3  -2  -2   9  -1  -3  -7 -10   6  -6   2
    6   7  -5  -6   2   3   2  -7   2  -6   8   4   3  -4   6   2  -9   4
   -6   5   5   2 -10   7   2   6  -4  -1]
 [  4   1   7  -7   6   4 -10   9   3   8   3   4   3  -3   6   5 -10  -3
    4   0   3  -7   4  -1   7  -4   8  -7  -2  -7 -10  -2  -2   4   4   3
    3   0 -10   6  -6   9 -10  -4   1   8   2   6   4  -3   3  -1  -5  -9
    7  -8   4   2  -8  -2  -7   1  -9  -2]
 [  6   6   7   1   5 -10  -6  -5  -5   1   6  -6   9  -8  -7  -4  -1  -7
    5   6   5  -9   9   9  -3  -7   4  -6  -6 -10  -9   5   2  -1   5  -2
  -10  -4  -2  -7  -1  -1   6  -6   8  -2  -1  -6 -10  -5  -2   4   5   7
   -1  -3  -7  -3  -8  -3  -4   0   8  -2]
 [ -3  -8   8  -5   4   4  -5  -4  -4   6  -6   3  -3  -1   9   9  -6   6
   -8   3   9 -10   5   7  -9  -4  -1  -3   3   7  -3  -7   9   6  -8  -8
   -6  -1   2  -9  -3  -9  -3   4   9   2  -9  -5  -7  -3   2   6   1   0
   -6  -3  -2  -1  -3   2   3  -4  -7  -1]]
label is:
[[0. 0. 0. 0. 1. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 1. 0. 0. 0. 0.]
 [0. 0. 1. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 1. 0. 0. 0.]
 [0. 1. 0. 0. 0. 0. 0. 0. 0. 0.]]
y is:
[[0.16498381 0.13111033 0.13155001 0.12187692 0.07096021 0.09526056
  0.03314523 0.09711349 0.1170037  0.03699574]
 [0.04933898 0.19133136 0.15308048 0.05293742 0.0225576  0.08762256
  0.04356623 0.20077257 0.16152935 0.03726345]
 [0.02060917 0.09092358 0.05903904 0.07573302 0.0842697  0.09835092
  0.15811163 0.15941703 0.19586902 0.0576769 ]
 [0.16498381 0.13111033 0.13155001 0.12187692 0.07096021 0.09526056
  0.03314523 0.09711349 0.1170037  0.03699574]
 [0.08478924 0.09742638 0.08964672 0.06428261 0.18220448 0.10274843
  0.07861632 0.08804225 0.10591324 0.10633033]]
GT is:
```

```
[[ 0.484705   -0.35809802 -0.43513374  0.43670688 -0.5690478  -0.52075697
  -0.65341536  0.64245883  0.69731902  0.27526216]]
Your answer is:
[[ 0.484705   -0.35809802 -0.43513374  0.43670688 -0.5690478  -0.52075697
  -0.65341536  0.64245883  0.69731902  0.27526216]]
Input is:
[[  7   0   4 -10   6  -6   7  -5  -4   8   3   2   2  -2   4  -9  -6   5
    8   4  -5 -10   7   2   4   3  -5  -2   4   4   4  -6   5  -6 -10  -7
    4   9  -6   3  -6   2   9  -5  -1   1  -3   1   4  -3  -5   0   9  -5
    3   2   9   9   9   6   2   2   6  -1]
 [  5   9   3  -5  -9   6   7   4   9   8   6   1  -9   0   3  -4   7 -10
    3  -4   9  -2  -2  -5 -10  -5   2  -8   1   0  -3   1  -1  -3  -8  -1
    1 -10   1  -8 -10   8  -2  -5  -4   2  -5  -9  -3  -8  -6  -9   3  -6
    8   6  -8   2   9   3   3   2   8   6]
 [  6   6   0   5   9  -5   9   6   2  -6   4 -10   8   7   7   5  -9   4
   -4   8   0  -5 -10   3   2  -1  -2   9   6   3   2   1   9   8  -3   1
   -3   0   3  -2   0   8   9  -5   4   6  -5   0   0  -5  -5 -10  -6   0
    9   1  -7  -9  -8   0   1   3  -2   9]
 [-10   9  -8  -5   5   0  -4  -9   1  -1  -3   4  -3   4   7   1   0   5
    2   1   6  -9   6  -1   5   6  -3  -9   6   8  -8  -6   9   7   0  -4
  -10  -4  -8  -2  -7   9  -6   3  -1   0   6   1   8  -7   5   3   6  -7
   -9  -2   5   1   9  -3   7  -2   6  -5]
 [ -4 -10  -1  -3   2   1  -2   4   2   4   0   5  -3  -4  -5  -4   0   4
    8  -5   0  -2   1   9  -7  -3   3  -8   8   4  -1   8  -3   0   8   7
    4 -10  -5  -2  -8 -10   4  -8   1  -9  -5  -8   9  -1   4  -5   8  -1
   -2   4   0  -5 -10   6   6  -5  -8  -3]]
label is:
[[0. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [0. 0. 0. 0. 0. 0. 0. 0. 1. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [0. 0. 0. 0. 0. 0. 0. 0. 1. 0.]
 [0. 1. 0. 0. 0. 0. 0. 0. 0. 0.]]
y is:
[[0.04255207 0.02659174 0.13938673 0.1323619  0.12313141 0.10353896
  0.0651754  0.20287983 0.10560678 0.05877518]
 [0.06137879 0.31184931 0.07619802 0.11968979 0.0293954  0.06396329
  0.09275213 0.05749744 0.03999142 0.14728441]
 [0.04255207 0.02659174 0.13938673 0.1323619  0.12313141 0.10353896
  0.0651754  0.20287983 0.10560678 0.05877518]
 [0.0386396  0.0299138  0.15946254 0.12617424 0.11238281 0.10731356
  0.06114051 0.20025166 0.10154662 0.06317468]
 [0.06137879 0.31184931 0.07619802 0.11968979 0.0293954  0.06396329
  0.09275213 0.05749744 0.03999142 0.14728441]]
GT is:
[[ 0.24650132 -0.2932041   0.59063204  0.63027761  0.41743644  0.44231806
   0.37699556  0.7210062  -1.60725697 -1.52470615]]
Your answer is:
[[ 0.24650132 -0.2932041   0.59063204  0.63027761  0.41743644  0.44231806
   0.37699556  0.7210062  -1.60725697 -1.52470615]]
Input is:
[[  4   3   8  -5 -10  -5   4   4  -7   7  -8  -9   4   3  -8  -2  -5   0
   -9  -4  -1   4   0  -4  -9   6  -1   2   0   4  -6   7   3  -3   4   9
```

```
  -10   8  -3   3   6  -1  -7   2  -5  -3 -10   8  -4  -3   3   3  -3  -4
   -2  -4  -5   8  -4   9  -8   2   1   9]
 [ -6   7  -9  -2   2   4   5   2   1   4  -3   3   7  -8  -8 -10   8  -9
    4 -10  -9  -8   1 -10 -10   1   4  -7  -9 -10  -6   8   2   1   2  -6
    7   0  -1  -9  -3   4  -8   2  -2   3   3  -1  -5  -4   5   8   9   8
    3   1   1   9  -6   7   8  -8 -10  -2]
 [ -5  -9   4  -6   0  -5   7  -5  -5   0  -7   9   1  -9   9   3   3   7
   -9   5  -2   7 -10   3   7  -9   3  -1   0   7  -5  -8  -6  -6  -5  -3
    8   1  -1  -2  -7  -2  -3  -5  -9   2   0   8  -8  -1   1  -9   4   3
    3 -10   4   3  -1 -10  -6  -3  -4 -10]
 [ -9   2  -5   6   6   3 -10   1  -3  -8  -8   3   4   7 -10  -1  -8   4
    7  -3  -1  -4  -6   1   6  -3   8   2   6  -8  -5  -9   7   5  -2   6
   -9  -7  -7   1   1  -8   1  -9  -2  -5   0  -8   8   7  -5 -10   2 -10
    1   1   8  -9  -9  -3  -5 -10  -5  -2]
 [ -8  -6  -4   9  -2   8  -4  -6  -8  -7  -4  -7   7  -9  -3   1   8   2
   -4 -10   5  -5  -5  -3  -5 -10  -3  -5  -9   2   1  -2   4 -10   6  -2
    2  -3  -4   2   9   7  -8   0   5  -7  -8   0  -6   6  -1  -2   3   4
   -1   8  -7   5  -4   0   7  -2  -3   1]]
label is:
[[0. 0. 0. 0. 0. 0. 1. 0. 0. 0.]
 [0. 1. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 1. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 1. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 0. 1.]]
y is:
[[0.09167892 0.05446512 0.14140167 0.03382833 0.17479519 0.14277249
  0.07563172 0.06395043 0.0631705  0.15830561]
 [0.14708007 0.08638473 0.06498386 0.07394626 0.07546731 0.09142836
  0.14094658 0.06693665 0.0768741  0.17595208]
 [0.14708007 0.08638473 0.06498386 0.07394626 0.07546731 0.09142836
  0.14094658 0.06693665 0.0768741  0.17595208]
 [0.14708007 0.08638473 0.06498386 0.07394626 0.07546731 0.09142836
  0.14094658 0.06693665 0.0768741  0.17595208]
 [0.14708007 0.08638473 0.06498386 0.07394626 0.07546731 0.09142836
  0.14094658 0.06693665 0.0768741  0.17595208]]
GT is:
[[ 0.6799992  -0.59999594  0.4013371   0.32961335  0.47666445 -0.49151406
  -0.36058196  0.33169704 -0.6293331  -0.13788607]]
Your answer is:
[[ 0.6799992  -0.59999594  0.4013371   0.32961335  0.47666445 -0.49151406
  -0.36058196  0.33169704 -0.6293331  -0.13788607]]
Input is:
[[ -8   3   3   0  -1   8  -9  -2   4  -2  -9  -1  -9  -4  -5  -5   9   8
    2   0 -10  -5  -1  -6   9   7  -8  -2   6   7   7  -5  -7  -8  -5  -3
   -1   6   2   3   3   3   4  -9  -5  -4  -2   8  -9  -6  -1  -5   2  -9
    8  -2   2 -10   1   2   8   2  -6   7]
 [  5  -3  -8   1  -4   7   1   8   3  -3   1  -6  -1  -1   5  -6   2  -6
   -2   2  -2   1  -1  -3  -1  -6  -2  -5   1  -3  -3  -3   9  -6  -3  -6
    8   0  -5   6  -6  -1  -3   4   2   9  -7  -1  -9  -8   6   8   9   7
   -7   5   4   1   9   5  -7  -5   3  -3]
 [  7  -9   2  -1  -1  -8  -9   2   5  -2 -10   8  -4   1   8  -9  -8  -6
   -1   8   6   9   8   1  -5   1  -1  -2   6  -2  -5  -1   9   2  -5  -8
```

```
  -2  -7   1   1   4  -5 -10  -3  -2 -10  -6   4   5   3   2 -10  -5   7
   6   6   3   0   6   7   5   8   7  -6]
 [  6  -5   4  -9  -9   4   2   0   4   8  -7   1  -2  -6   5  -4   0   5
  -9   1   2 -10  -9   1   5   3  -7   1   4  -4  -9   3  -4 -10  -6   6
  -2   3   5   3   9   2  -7   8  -9   9   7  -7  -7 -10  -5 -10  -9  -1
   4  -2   9  -9  -8  -2  -3   0  -8   7]
 [  1   2  -7  -3  -4   4   2   9   6  -8   7  -5   6   9  -5   4   6   5
   4 -10   6   0  -5   2   9   1   4  -1  -8  -2  -8   6   7  -6  -5   1
   3   7 -10   2  -8   4  -6  -4  -6   5   0   7  -6   8   5   1   7   1
   7  -4   9   1   7   7   1   5  -3  -5]]
label is:
[[0. 0. 0. 0. 0. 0. 1. 0. 0. 0.]
 [0. 0. 0. 0. 1. 0. 0. 0. 0. 0.]
 [0. 0. 1. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 1. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 0. 1.]]
y is:
[[0.03094589 0.07553233 0.04824426 0.04528136 0.20703182 0.23418393
  0.04436394 0.13354368 0.0313783  0.14949449]
 [0.03094589 0.07553233 0.04824426 0.04528136 0.20703182 0.23418393
  0.04436394 0.13354368 0.0313783  0.14949449]
 [0.08367331 0.14268628 0.03364155 0.142663   0.23087769 0.02860431
  0.05577022 0.17936648 0.06164687 0.04107028]
 [0.03094589 0.07553233 0.04824426 0.04528136 0.20703182 0.23418393
  0.04436394 0.13354368 0.0313783  0.14949449]
 [0.21289513 0.08786724 0.13187449 0.06432991 0.07040422 0.02022028
  0.11837092 0.12929206 0.09424712 0.07049864]]
GT is:
[[ 0.38940612  0.45715052 -1.68975118  0.34283698 -0.07762261  0.75137638
  -0.69276705  0.70928959  0.25002887 -0.43994762]]
Your answer is:
[[ 0.38940612  0.45715052 -1.68975118  0.34283698 -0.07762261  0.75137638
  -0.69276705  0.70928959  0.25002887 -0.43994762]]
Input is:
[[  0   5   1   1  -1   3  -2  -8  -5   4   4   3  -7   6   1  -3   3   1
   -1   2 -10  -9   5   7  -3  -4  -1  -3  -7  -5  -2   4   0   0  -6   2
   -3  -8 -10   5   7  -8   7   0  -5 -10  -3   5   4   4   7   9 -10  -5
   -8  -9  -6   3  -5 -10  -1  -9  -9   7]
 [ -9   3  -6  -9   2   6   5   8   3   5  -1  -8  -3  -3  -3   1  -3   9
   -8   9  -8   5  -4  -2 -10 -10  -6   1 -10  -2  -7  -9  -5   1   8   1
    5  -3  -8   1  -4  -1 -10   3  -1   2   5  -7   6   5   3   7   3   7
    3   1   6  -4  -7 -10  -2  -9  -6  -5]
 [ -6   5   9  -1  -8  -7  -4   7   5  -5   3  -1   5   4  -4   8  -3  -3
    2   6  -3  -9   5  -4  -8  -1  -8   0   3   8 -10 -10   4  -5   2  -8
   -2   1   7   7   3   7   0  -9  -5  -7  -3   5  -6  -4   2  -1   5   5
  -10   8   5  -8   0   0  -9   5  -7  -8]
 [-10  -7   4  -3   1   9   9   1   4  -3  -9  -4  -3   0  -3  -8   3   9
   -6   0   7  -3  -1  -2  -7   8  -4  -5   5  -8   7   0   2   0   9  -5
   -8 -10  -5  -1   4 -10   0   6  -6   4   8   7   7  -5  -5   1  -7   8
    1   9   7  -4  -7  -5  -7   1   5  -7]
 [  2   9   1 -10  -2  -9   0  -2 -10  -3  -9  -3  -2   7  -9   3   4  -8
   -8  -6  -5   4   6  -6  -6   4  -7  -8  -7   6  -2   3   1   7  -6   0
```

```
   -8  -7   1   0 -10   1   7  -3  -3   7  -1   5   1   0   5   3  -9  -3
   -5  -2  -7  -4   2   2   6  -4   0  -9]]
label is:
[[1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 1. 0. 0.]
 [0. 0. 1. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 1. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 1. 0. 0.]]
y is:
[[0.06051556 0.14119713 0.05548805 0.04086086 0.09673836 0.22300029
  0.07370525 0.08415065 0.07017348 0.15417037]
 [0.06051556 0.14119713 0.05548805 0.04086086 0.09673836 0.22300029
  0.07370525 0.08415065 0.07017348 0.15417037]
 [0.06051551 0.14119713 0.05548809 0.04086089 0.09673831 0.22300027
  0.07370529 0.08415066 0.07017347 0.15417039]
 [0.06051558 0.14119706 0.05548812 0.04086087 0.09673843 0.22300006
  0.07370522 0.08415074 0.07017351 0.15417042]
 [0.06051556 0.14119713 0.05548805 0.04086086 0.09673836 0.22300029
  0.07370525 0.08415065 0.07017348 0.15417037]]
GT is:
[[-0.69742224  0.70598557 -0.72255965  0.20430433  0.48369182  1.11500121
   0.36852627 -2.57924665  0.35086743  0.77085191]]
Your answer is:
[[-0.69742224  0.70598557 -0.72255965  0.20430433  0.48369182  1.11500121
   0.36852627 -2.57924665  0.35086743  0.77085191]]
```

test_dEdw (test_MLP.TestMLP) (4/4)

ten tests for dEdw() with random weights and inputs
Input is:
```
[[ -6   8  -4  -5  -3   1   4  -9  -5  -9  -5   2  -4  -3  -7   3   1   2
   -2   5  -1  -1 -10   3   3  -5   2  -3  -4  -6  -9   7 -10   7  -8   6
    4  -5  -1   5  -6  -6   9   1  -3  -7   3  -2  -3  -9  -2   3   0   7
   -8  -7   4  -1  -4   9   7   0  -5   7]
 [ -7   4   8   7   7 -10   4   6   5 -10  -1  -2   6   8   8   6   1 -10
    7   6  -7  -2   9  -2   9   6   9   1   9   4   1  -2   5   1  -9  -3
   -3   1   9   9   7  -3   2  -1   6 -10  -4  -2  -5  -6   2  -1   5   1
    0  -2   6   8  -7  -2   4  -2  -3  -4]
 [ -3  -4  -7   8  -8   4   3  -8   8   8   9  -2  -2   9   1  -5  -6  -2
    3   3  -6  -3  -1   9  -7  -5   5   7  -2   5   7  -4  -3   0   3  -7
   -2  -7  -3  -8   3  -6   5   1  -6  -3   2   6   1   2  -8  -3   9  -1
   -3   9  -7  -3  -7   1  -9  -8   8 -10]
 [ -4  -8  -7   6   3   6   2  -9   5 -10  -9   9   9   0  -4   2  -8 -10
    8  -2   9   0   3  -6  -3  -3   8  -7 -10   3  -1  -9   3   5  -8   7
   -7  -3   4   7   9   7  -3   7  -8  -2   6   7  -1  -2 -10   7  -1  -4
   -1   9   5   3   1  -7   5   1   2  -7]
 [ -3   9 -10   7  -3  -4 -10   6  -6   6  -6  -7  -9  -2   7  -4   1   5
   -3  -4   7  -6   2   8   3  -6  -8  -8  -5  -2  -4   7   3   6 -10   0
   -2  -2   2   0  -5  -7  -6  -9 -10   0   2  -8   6   1   3  -2   2   9
    6  -6 -10   2  -9  -6   8  -1   1  -6]]
```
label is:
```
[[0. 0. 0. 0. 0. 0. 0. 1. 0. 0.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 1. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 1. 0. 0. 0.]
 [0. 0. 0. 0. 0. 1. 0. 0. 0. 0.]]
```
z is:
```
[[-1.         -1.         -1.         -1.        ]
 [ 1.          1.          1.          1.        ]
 [-1.         -0.99999701 -1.         -1.        ]
 [-1.         -0.99999995  1.          1.        ]
 [-1.         -1.         -1.         -1.        ]]
```
y is:
```
[[0.03312036 0.06937731 0.02568226 0.10309275 0.09123149 0.22037911
  0.15362202 0.05468489 0.17984798 0.06896183]
 [0.08319382 0.1579406  0.15764154 0.09915148 0.12080909 0.0596178
  0.08150773 0.08507963 0.05689312 0.0981652 ]
 [0.03312032 0.0693773  0.02568224 0.10309283 0.09123146 0.22037912
  0.15362215 0.0546848  0.17984807 0.06896172]
 [0.05200413 0.05625388 0.12927929 0.03944257 0.13662674 0.08566495
  0.07459786 0.08110046 0.05199072 0.2930394 ]
 [0.03312036 0.06937731 0.02568226 0.10309275 0.09123149 0.22037911
  0.15362202 0.05468489 0.17984798 0.06896183]]
```
GT is:
```
[[-4.18322136e-12  5.11954794e-07 -1.50909193e-14 -1.70139649e-14]
 [-5.58292627e-12  8.23787244e-07 -3.01818385e-14  3.08639389e-14]
 [-9.75621428e-12  1.07102794e-06 -2.64091087e-14 -5.20567650e-14]
 [ 1.11459858e-11 -1.11814629e-06  2.26363789e-14  4.12514019e-14]
 [-1.11281058e-11  6.41660914e-07  1.13181894e-14 -2.47747172e-14]
 [ 5.57895293e-12 -7.17901605e-07  2.26363789e-14 -1.02680829e-14]
```

```
[ 4.17924802e-12 -4.06069154e-07  7.54545963e-15 -3.65352605e-14]
[-1.11519458e-11  1.27697475e-06 -3.39545683e-14  1.22978235e-14]
[ 1.11439992e-11 -1.06520347e-06  1.88636491e-14 -1.22978235e-14]
[ 1.11141991e-11 -2.71061176e-07 -3.77272981e-14  3.71322307e-14]
[ 1.25079440e-11 -4.24065167e-07 -3.39545683e-14 -1.07456730e-14]
[-2.76563643e-12 -2.76363034e-07  3.39545683e-14 -3.19384992e-14]
[-2.76563643e-12 -2.76363034e-07  3.39545683e-14 -4.01768416e-14]
[ 1.25258241e-11 -9.00550545e-07  0.00000000e+00  5.73101169e-15]
[ 1.38381155e-12  1.11710107e-07 -1.50909193e-14  3.03863487e-14]
[-6.95481780e-12  3.94420219e-07  7.54545963e-15 -2.42374370e-14]
[-8.36644272e-12  1.02390959e-06 -3.01818385e-14 -5.19373152e-15]
[-2.80338315e-12  7.29550540e-07 -3.77272981e-14  1.74915550e-14]
[ 4.19116804e-12 -7.23726073e-07  3.01818385e-14 -7.70106220e-15]
[ 4.17130135e-12 -1.94297875e-07 -7.54545963e-15 -1.18202334e-14]
[-8.33266934e-12  1.23881652e-07  3.39545683e-14  1.95212956e-14]
[-4.17527468e-12  3.00183515e-07  0.00000000e+00 -2.93714785e-14]
[-1.38579822e-12 -5.87672875e-08  1.13181894e-14  6.68619192e-15]
[ 1.25139040e-11 -5.82893626e-07 -2.26363789e-14  4.69227235e-14]
[-9.74826760e-12  8.59256661e-07 -1.13181894e-14  1.49246040e-15]
[-6.96475115e-12  6.59134317e-07 -1.13181894e-14 -3.24757794e-14]
[ 6.97468450e-12 -9.23848416e-07  3.01818385e-14 -2.51926172e-14]
[ 9.72840091e-12 -3.29828463e-07 -2.64091087e-14 -2.20883163e-14]
[-2.80338315e-12  7.29550540e-07 -3.77272981e-14 -2.37001568e-14]
[ 6.96475115e-12 -6.59134317e-07  1.13181894e-14 -4.77590113e-16]
[ 9.74032093e-12 -6.47485382e-07 -3.77272981e-15 -5.61163158e-15]
[-5.58491294e-12  8.76730064e-07 -3.39545683e-14  2.26255965e-14]
[-4.16931468e-12  1.41355056e-07  1.13181894e-14  7.70106220e-15]
[ 9.93334712e-15 -2.64714099e-07  1.88636491e-14  2.47150271e-14]
[ 4.15938133e-12  1.23359043e-07 -3.01818385e-14 -3.65352605e-14]
[-9.72840091e-12  3.29828463e-07  2.64091087e-14 -1.08650532e-14]
[-2.79742314e-12  5.70722081e-07 -2.64091087e-14 -1.13426433e-14]
[-9.74826760e-12  8.59256661e-07 -1.13181894e-14 -1.91033955e-14]
[-4.16732801e-12  8.84122361e-08  1.50909193e-14  3.58189102e-15]
[-1.11201591e-11  4.29889635e-07  2.64091087e-14 -1.24172036e-14]
[ 4.19315471e-12 -7.76668892e-07  3.39545683e-14 -1.59394046e-14]
[-8.33664268e-12  2.29767292e-07  2.64091087e-14 -3.81471010e-14]
[ 6.95283113e-12 -3.41477399e-07 -1.13181894e-14 -1.69542748e-14]
[ 1.40566491e-12 -4.70660910e-07  2.64091087e-14 -3.55203902e-14]
[-8.36644272e-12  1.02390959e-06 -3.01818385e-14 -5.05046145e-14]
[-4.17924802e-12  4.06069154e-07 -7.54545963e-15 -4.65645135e-15]
[ 2.79543647e-12 -5.17779262e-07  2.26363789e-14  1.13426433e-14]
[ 8.36445605e-12 -9.70966768e-07  2.64091087e-14 -2.36404668e-14]
[ 1.38977156e-12 -4.71183519e-08 -3.77272981e-15  2.62671776e-14]
[ 2.77954312e-12 -9.42367038e-08 -7.54545963e-15  7.22347209e-15]
[-1.11539325e-11  1.32991757e-06 -3.77272981e-14 -5.96900552e-17]
[-4.16136800e-12 -7.04162231e-08  2.64091087e-14 -1.28947937e-14]
[ 1.25238374e-11 -8.47607725e-07 -3.77272981e-15  2.22076964e-14]
[-1.39970491e-12  3.11832451e-07 -1.50909193e-14  3.55203902e-14]
[-4.17726135e-12  3.53126335e-07 -3.77272981e-15  2.00585758e-14]
[ 1.25437041e-11 -1.37703592e-06  3.39545683e-14 -1.07456730e-14]
[-9.73237425e-12  4.35714103e-07  1.88636491e-14 -5.20567650e-14]
[-4.16931468e-12  1.41355056e-07  1.13181894e-14  3.58189102e-15]
```

```
 [-9.74032093e-12  6.47485382e-07  3.77272981e-15 -4.79375938e-14]
 [ 1.37785154e-12  2.70538566e-07 -2.64091087e-14 -2.31628767e-14]
 [-1.25158907e-11  6.35836446e-07  1.88636491e-14  1.89840154e-14]
 [-1.11320792e-11  7.47546553e-07  3.77272981e-15 -1.65363748e-14]
 [ 1.11380392e-11 -9.06375013e-07  7.54545963e-15  1.65363748e-14]
 [-1.39314890e-11  1.37121145e-06 -2.64091087e-14 -4.02365316e-14]]
Your answer is:
[[-4.18322136e-12  5.11954794e-07 -1.50909193e-14 -1.70139649e-14]
 [-5.58292627e-12  8.23787244e-07 -3.01818385e-14  3.08639389e-14]
 [-9.75621428e-12  1.07102794e-06 -2.64091087e-14 -5.20567650e-14]
 [ 1.11459858e-11 -1.11814629e-06  2.26363789e-14  4.12514019e-14]
 [-1.11281058e-11  6.41660914e-07  1.13181894e-14 -2.47747172e-14]
 [ 5.57895293e-12 -7.17901605e-07  2.26363789e-14 -1.02680829e-14]
 [ 4.17924802e-12 -4.06069154e-07  7.54545963e-15 -3.65352605e-14]
 [-1.11519458e-11  1.27697475e-06 -3.39545683e-14  1.22978235e-14]
 [ 1.11439992e-11 -1.06520347e-06  1.88636491e-14 -1.22978235e-14]
 [ 1.11141991e-11 -2.71061176e-07 -3.77272981e-14  3.71322307e-14]
 [ 1.25079440e-11 -4.24065167e-07 -3.39545683e-14 -1.07456730e-14]
 [-2.76563643e-12 -2.76363034e-07  3.39545683e-14 -3.19384992e-14]
 [-2.76563643e-12 -2.76363034e-07  3.39545683e-14 -4.01768416e-14]
 [ 1.25258241e-11 -9.00550545e-07  0.00000000e+00  5.73101169e-15]
 [ 1.38381155e-12  1.11710107e-07 -1.50909193e-14  3.03863487e-14]
 [-6.95481780e-12  3.94420219e-07  7.54545963e-15 -2.42374370e-14]
 [-8.36644272e-12  1.02390959e-06 -3.01818385e-14 -5.19373152e-15]
 [-2.80338315e-12  7.29550540e-07 -3.77272981e-14  1.74915550e-14]
 [ 4.19116804e-12 -7.23726073e-07  3.01818385e-14 -7.70106220e-15]
 [ 4.17130135e-12 -1.94297875e-07 -7.54545963e-15 -1.18202334e-14]
 [-8.33266934e-12  1.23881652e-07  3.39545683e-14  1.95212956e-14]
 [-4.17527468e-12  3.00183515e-07  0.00000000e+00 -2.93714785e-14]
 [-1.38579822e-12 -5.87672875e-08  1.13181894e-14  6.68619192e-15]
 [ 1.25139040e-11 -5.82893626e-07 -2.26363789e-14  4.69227235e-14]
 [-9.74826760e-12  8.59256661e-07 -1.13181894e-14  1.49246040e-15]
 [-6.96475115e-12  6.59134317e-07 -1.13181894e-14 -3.24757794e-14]
 [ 6.97468450e-12 -9.23848416e-07  3.01818385e-14 -2.51926172e-14]
 [ 9.72840091e-12 -3.29828463e-07 -2.64091087e-14 -2.20883163e-14]
 [-2.80338315e-12  7.29550540e-07 -3.77272981e-14 -2.37001568e-14]
 [ 6.96475115e-12 -6.59134317e-07  1.13181894e-14 -4.77590113e-16]
 [ 9.74032093e-12 -6.47485382e-07 -3.77272981e-15 -5.61163158e-15]
 [-5.58491294e-12  8.76730064e-07 -3.39545683e-14  2.26255965e-14]
 [-4.16931468e-12  1.41355056e-07  1.13181894e-14  7.70106220e-15]
 [ 9.93334712e-15 -2.64714099e-07  1.88636491e-14  2.47150271e-14]
 [ 4.15938133e-12  1.23359043e-07 -3.01818385e-14 -3.65352605e-14]
 [-9.72840091e-12  3.29828463e-07  2.64091087e-14 -1.08650532e-14]
 [-2.79742314e-12  5.70722081e-07 -2.64091087e-14 -1.13426433e-14]
 [-9.74826760e-12  8.59256661e-07 -1.13181894e-14 -1.91033955e-14]
 [-4.16732801e-12  8.84122361e-08  1.50909193e-14  3.58189102e-15]
 [-1.11201591e-11  4.29889635e-07  2.64091087e-14 -1.24172036e-14]
 [ 4.19315471e-12 -7.76668892e-07  3.39545683e-14 -1.59394046e-14]
 [-8.33664268e-12  2.29767292e-07  2.64091087e-14 -3.81471010e-14]
 [ 6.95283113e-12 -3.41477399e-07 -1.13181894e-14 -1.69542748e-14]
 [ 1.40566491e-12 -4.70660910e-07  2.64091087e-14 -3.55203902e-14]
 [-8.36644272e-12  1.02390959e-06 -3.01818385e-14 -5.05046145e-14]
```

```
 [-4.17924802e-12  4.06069154e-07 -7.54545963e-15 -4.65645135e-15]
 [ 2.79543647e-12 -5.17779262e-07  2.26363789e-14  1.13426433e-14]
 [ 8.36445605e-12 -9.70966768e-07  2.64091087e-14 -2.36404668e-14]
 [ 1.38977156e-12 -4.71183519e-08 -3.77272981e-15  2.62671776e-14]
 [ 2.77954312e-12 -9.42367038e-08 -7.54545963e-15  7.22347209e-15]
 [-1.11539325e-11  1.32991757e-06 -3.77272981e-14 -5.96900552e-17]
 [-4.16136800e-12 -7.04162231e-08  2.64091087e-14 -1.28947937e-14]
 [ 1.25238374e-11 -8.47607725e-07 -3.77272981e-15  2.22076964e-14]
 [-1.39970491e-12  3.11832451e-07 -1.50909193e-14  3.55203902e-14]
 [-4.17726135e-12  3.53126335e-07 -3.77272981e-15  2.00585758e-14]
 [ 1.25437041e-11 -1.37703592e-06  3.39545683e-14 -1.07456730e-14]
 [-9.73237425e-12  4.35714103e-07  1.88636491e-14 -5.20567650e-14]
 [-4.16931468e-12  1.41355056e-07  1.13181894e-14  3.58189102e-15]
 [-9.74032093e-12  6.47485382e-07  3.77272981e-15 -4.79375938e-14]
 [ 1.37785154e-12  2.70538566e-07 -2.64091087e-14 -2.31628767e-14]
 [-1.25158907e-11  6.35836446e-07  1.88636491e-14  1.89840154e-14]
 [-1.11320792e-11  7.47546553e-07  3.77272981e-15 -1.65363748e-14]
 [ 1.11380392e-11 -9.06375013e-07  7.54545963e-15  1.65363748e-14]
 [-1.39314890e-11  1.37121145e-06 -2.64091087e-14 -4.02365316e-14]]
Input is:
[[ -8  -1   5  -9   5  -5  -1  -5   8  -1  -7   4  -2   4   9  -8   7  -3
   -4  -5  -1   8  -5   2   1  -3  -9  -7  -4  -6   7  -6   9   4   5   8
    2   4  -6  -7  -3  -8  -8   1   6   6  -7   1  -2 -10  -1   8 -10  -9
  -10  -6  -6  -3   9   4   2  -5  -8   1]
 [  9  -7  -1  -4  -3   8  -5   7  -9  -4   9   4  -6   3   2  -8   3  -9
    7  -8   2  -2   2   5   5   8  -4  -9   1   6  -9  -6   4   5  -4  -7
    8  -9   8   2  -2 -10  -7  -2   8   9   2   3   1  -9   5   7  -5  -9
   -6  -9   7   0   1   3  -3  -2  -7   8]
 [  8  -6  -7   1  -6  -5   5   8  -9  -5  -9   9   9   6   4   1   3   0
   -1  -6   1  -9   7   3   7   4   5 -10   9  -6  -7  -3  -4  -7   4   9
    8  -5  -9   9  -3  -2  -9 -10   1   8  -2  -6   1   6   7  -3   1  -2
    5  -4  -2  -9   1   6  -7   8  -2  -9]
 [  5   2   5   9   2  -6  -9   7   3  -4   4   7 -10  -5   9  -3   5   2
    1  -3  -3  -8   8   3  -9  -4   2  -2  -2  -7  -7 -10  -1  -5   2  -8
   -3  -3  -2   2   7   4   3   9  -5  -5  -4  -7  -4  -7   5   2  -6 -10
    7  -2  -3   8   9   7   0  -3  -1   0]
 [  6   0  -8   9  -7 -10   5  -1   3   1 -10  -9   2   4  -7   7  -3  -3
   -8  -4  -7  -8  -7  -3  -6  -3   5   9   6  -8  -2  -8   2  -8  -4   9
    1  -2  -9   9  -9  -1   7  -7   6   5  -6  -4  -2   0  -7   4  -8   7
    1  -5   8  -1  -4  -7   6   9  -6  -5]]
label is:
[[0. 0. 1. 0. 0. 0. 0. 0. 0. 0.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 1. 0. 0.]
 [0. 0. 0. 0. 1. 0. 0. 0. 0. 0.]
 [0. 1. 0. 0. 0. 0. 0. 0. 0. 0.]]
z is:
[[-1.         -1.         -1.         -1.        ]
 [-1.          0.99999998 -0.99999962 -0.36380941]
 [-0.99996681  0.99999461 -0.62312724  0.95169139]
 [-1.         -0.99999323 -0.99999999  1.        ]
 [-1.         -1.         -1.         -1.        ]]
```

y is:
```
[[0.08478049 0.12358284 0.05904848 0.03860515 0.03878329 0.07066044
  0.15263144 0.20086611 0.03750261 0.19353916]
 [0.04856359 0.10296821 0.04976688 0.10376643 0.05431896 0.16096793
  0.1690454  0.07815447 0.02472316 0.20772498]
 [0.08779753 0.09361187 0.04484791 0.12366003 0.05446289 0.13618575
  0.1733747  0.0491789  0.04742666 0.18945376]
 [0.16166242 0.12242666 0.03512525 0.04255148 0.03416207 0.04001897
  0.1867692  0.10327002 0.08598833 0.1880256 ]
 [0.08478049 0.12358284 0.05904848 0.03860515 0.03878329 0.07066044
  0.15263144 0.20086611 0.03750261 0.19353916]]
```
GT is:
```
[[-2.06098349e-04  1.96938020e-05  7.86525226e-01 -2.61079938e+00]
 [ 1.54573762e-04 -3.58208714e-05 -5.89893865e-01  2.03755302e+00]
 [ 1.80336055e-04 -5.14463943e-05 -6.88211556e-01  9.94787883e-02]
 [-2.57622936e-05 -2.82688831e-05  9.83170875e-02  1.30244640e+00]
 [ 1.54573762e-04 -3.57620011e-05 -5.89895003e-01  7.66297353e-01]
 [ 1.28811468e-04 -1.58467896e-06 -4.91582135e-01 -2.69846499e+00]
 [-1.28811468e-04  5.65336331e-05  4.91581324e-01  1.74502324e+00]
 [-2.06098349e-04  1.23437267e-05  7.86525789e-01 -1.97517155e+00]
 [ 2.31860643e-04 -5.37092308e-05 -8.84841224e-01  2.57960865e+00]
 [ 1.28811468e-04 -9.08193012e-06 -4.91578726e-01  1.11530200e+00]
 [ 2.31860643e-04 -5.71046344e-05 -8.84846349e-01 -3.14104184e+00]
 [-2.31860643e-04  1.70324420e-05  8.84842618e-01 -9.90539071e-01]
 [-2.31860643e-04  7.91107077e-05  8.84845512e-01  2.18760009e+00]
 [-1.54573762e-04  4.67429614e-05  5.89895012e-01 -7.66297353e-01]
 [-1.03049175e-04 -1.39819735e-05  3.93263306e-01 -5.10864902e-01]
 [-2.57622936e-05  1.55960877e-05  9.83182601e-02  2.57370206e+00]
 [-7.72868809e-05 -4.05884362e-06  2.94947057e-01 -8.59869550e-01]
 [-6.56580180e-17 -7.45309842e-06  2.55516525e-06  2.86032524e+00]
 [ 2.57622936e-05 -8.29016505e-06 -9.83179698e-02 -2.25588814e+00]
 [ 1.54573762e-04 -1.75339886e-05 -5.89893566e-01  2.35536693e+00]
 [-2.57622936e-05  1.57432635e-05  9.83154147e-02 -6.04437100e-01]
 [ 2.31860643e-04 -1.33426867e-05 -8.84843184e-01  3.54911239e-01]
 [-1.80336055e-04  3.87695065e-06  6.88211234e-01 -4.17292704e-01]
 [-7.72868809e-05  3.29123173e-06  2.94946494e-01 -1.49549738e+00]
 [-1.80336055e-04  6.61465450e-05  6.88210429e-01 -1.37073445e+00]
 [-1.03049175e-04  3.36904931e-05  3.93261636e-01 -2.41774840e+00]
 [-1.28811468e-04  1.62848296e-05  4.91581008e-01  1.42720933e+00]
 [ 2.57622936e-04 -4.01404984e-05 -9.83157185e-01  2.54841792e+00]
 [-2.31860643e-04  4.99311701e-05  8.84843497e-01 -3.70973232e-02]
 [ 1.54573762e-04 -2.68666206e-06 -5.89897538e-01 -2.09402789e+00]
 [ 1.80336055e-04 -7.64029381e-06 -6.88209245e-01  2.64199012e+00]
 [ 7.72868809e-05  2.23162913e-05 -2.94946189e-01  1.81331130e+00]
 [ 1.03049175e-04 -1.52122817e-05 -3.93265036e-01 -1.39601859e+00]
 [ 1.80336055e-04 -1.47548879e-05 -6.88213234e-01 -1.80740471e+00]
 [-1.03049175e-04  1.15519616e-05  3.93265033e-01  1.39601859e+00]
 [-2.31860643e-04  7.17753500e-05  8.84845791e-01  2.50541401e+00]
 [-2.06098349e-04  4.89616452e-05  7.86525533e-01 -2.29298547e+00]
 [ 1.28811468e-04 -1.28158381e-05 -4.91577306e-01  2.70437158e+00]
 [ 2.31860643e-04 -3.51574315e-05 -8.84846047e-01 -2.82322792e+00]
 [-2.31860643e-04  3.53046073e-05  8.84843201e-01 -3.54911239e-01]
```

```
 [ 7.72868809e-05 -3.98502799e-05 -2.94947376e-01  5.42055635e-01]
 [ 5.15245873e-05 -2.42541922e-05 -1.96629116e-01  3.11575770e+00]
 [ 2.31860643e-04 -5.36797956e-05 -8.84841793e-01  1.94398082e+00]
 [ 2.57622936e-04 -8.03009963e-05 -9.83159208e-01  3.23720507e-01]
 [-2.57622936e-05  2.31522091e-05  9.83137131e-02 -2.51132060e+00]
 [-2.06098349e-04  5.62970029e-05  7.86525255e-01 -2.61079938e+00]
 [ 5.15245873e-05  5.20497947e-06 -1.96632508e-01 -6.98009297e-01]
 [ 1.54573762e-04 -2.73081480e-06 -5.89896684e-01 -1.14058614e+00]
 [-2.57622936e-05  1.93888660e-05  9.83157021e-02 -2.86623184e-01]
 [-1.54573762e-04  5.38869906e-05  5.89898432e-01  3.04746964e+00]
 [-1.80336055e-04  1.49020637e-05  6.88210389e-01 -1.37073445e+00]
 [ 7.72868809e-05 -2.14162212e-05 -2.94949923e-01 -2.31826961e+00]
 [-2.57622936e-05  2.66212007e-05  9.83174151e-02  1.62026031e+00]
 [ 5.15245873e-05  2.70050066e-05 -1.96629361e-01  2.79794378e+00]
 [-1.28811468e-04 -2.04620597e-06  4.91581563e-01  2.06283716e+00]
 [ 1.03049175e-04 -1.17432902e-05 -3.93261334e-01  2.73556231e+00]
 [ 5.15245873e-05  1.61824728e-06 -1.96633933e-01 -2.28707888e+00]
 [ 2.31860643e-04 -7.18783730e-05 -8.84843799e-01 -2.80716593e-01]
 [-2.57622936e-05 -2.81952952e-05  9.83156647e-02 -2.86623183e-01]
 [-1.54573762e-04  2.81912029e-06  5.89894977e-01 -7.66297353e-01]
 [ 1.80336055e-04 -3.31742290e-05 -6.88210972e-01  7.35106620e-01]
 [-2.06098349e-04  4.88144694e-05  7.86528379e-01  8.85153692e-01]
 [ 5.15245873e-05 -5.90843904e-06 -1.96629956e-01  2.16231595e+00]
 [ 2.31860643e-04 -4.24780716e-05 -8.84846053e-01 -2.82322792e+00]]
Your answer is:
[[-2.06098349e-04  1.96938020e-05  7.86525226e-01 -2.61079938e+00]
 [ 1.54573762e-04 -3.58208714e-05 -5.89893865e-01  2.03755302e+00]
 [ 1.80336055e-04 -5.14463943e-05 -6.88211556e-01  9.94787883e-02]
 [-2.57622936e-05 -2.82688831e-05  9.83170875e-02  1.30244640e+00]
 [ 1.54573762e-04 -3.57620011e-05 -5.89895003e-01  7.66297353e-01]
 [ 1.28811468e-04 -1.58467896e-06 -4.91582135e-01 -2.69846499e+00]
 [-1.28811468e-04  5.65336331e-05  4.91581324e-01  1.74502324e+00]
 [-2.06098349e-04  1.23437267e-05  7.86525789e-01 -1.97517155e+00]
 [ 2.31860643e-04 -5.37092308e-05 -8.84841224e-01  2.57960865e+00]
 [ 1.28811468e-04 -9.08193012e-06 -4.91578726e-01  1.11530200e+00]
 [ 2.31860643e-04 -5.71046344e-05 -8.84846349e-01 -3.14104184e+00]
 [-2.31860643e-04  1.70324420e-05  8.84842618e-01 -9.90539071e-01]
 [-2.31860643e-04  7.91107077e-05  8.84845512e-01  2.18760009e+00]
 [-1.54573762e-04  4.67429614e-05  5.89895012e-01 -7.66297353e-01]
 [-1.03049175e-04 -1.39819735e-05  3.93263306e-01 -5.10864902e-01]
 [-2.57622936e-05  1.55960877e-05  9.83182601e-02  2.57370206e+00]
 [-7.72868809e-05 -4.05884362e-06  2.94947057e-01 -8.59869550e-01]
 [-6.56580180e-17 -7.45309842e-06  2.55516525e-06  2.86032524e+00]
 [ 2.57622936e-05 -8.29016505e-06 -9.83179698e-02 -2.25588814e+00]
 [ 1.54573762e-04 -1.75339886e-05 -5.89893566e-01  2.35536693e+00]
 [-2.57622936e-05  1.57432635e-05  9.83154147e-02 -6.04437100e-01]
 [ 2.31860643e-04 -1.33426867e-05 -8.84843184e-01  3.54911239e-01]
 [-1.80336055e-04  3.87695065e-06  6.88211234e-01 -4.17292704e-01]
 [-7.72868809e-05  3.29123173e-06  2.94946494e-01 -1.49549738e+00]
 [-1.80336055e-04  6.61465450e-05  6.88210429e-01 -1.37073445e+00]
 [-1.03049175e-04  3.36904931e-05  3.93261636e-01 -2.41774840e+00]
 [-1.28811468e-04  1.62848296e-05  4.91581008e-01  1.42720933e+00]
```

```
 [ 2.57622936e-04 -4.01404984e-05 -9.83157185e-01  2.54841792e+00]
 [-2.31860643e-04  4.99311701e-05  8.84843497e-01 -3.70973232e-02]
 [ 1.54573762e-04 -2.68666206e-06 -5.89897538e-01 -2.09402789e+00]
 [ 1.80336055e-04 -7.64029381e-06 -6.88209245e-01  2.64199012e+00]
 [ 7.72868809e-05  2.23162913e-05 -2.94946189e-01  1.81331130e+00]
 [ 1.03049175e-04 -1.52122817e-05 -3.93265036e-01 -1.39601859e+00]
 [ 1.80336055e-04 -1.47548879e-05 -6.88213234e-01 -1.80740471e+00]
 [-1.03049175e-04  1.15519616e-05  3.93265033e-01  1.39601859e+00]
 [-2.31860643e-04  7.17753500e-05  8.84845791e-01  2.50541401e+00]
 [-2.06098349e-04  4.89616452e-05  7.86525533e-01 -2.29298547e+00]
 [ 1.28811468e-04 -1.28158381e-05 -4.91577306e-01  2.70437158e+00]
 [ 2.31860643e-04 -3.51574315e-05 -8.84846047e-01 -2.82322792e+00]
 [-2.31860643e-04  3.53046073e-05  8.84843201e-01 -3.54911239e-01]
 [ 7.72868809e-05 -3.98502799e-05 -2.94947376e-01  5.42055635e-01]
 [ 5.15245873e-05 -2.42541922e-05 -1.96629116e-01  3.11575770e+00]
 [ 2.31860643e-04 -5.36797956e-05 -8.84841793e-01  1.94398082e+00]
 [ 2.57622936e-04 -8.03009963e-05 -9.83159208e-01  3.23720507e-01]
 [-2.57622936e-05  2.31522091e-05  9.83137131e-02 -2.51132060e+00]
 [-2.06098349e-04  5.62970029e-05  7.86525255e-01 -2.61079938e+00]
 [ 5.15245873e-05  5.20497947e-06 -1.96632508e-01 -6.98009297e-01]
 [ 1.54573762e-04 -2.73081480e-06 -5.89896684e-01 -1.14058614e+00]
 [-2.57622936e-05  1.93888660e-05  9.83157021e-02 -2.86623184e-01]
 [-1.54573762e-04  5.38869906e-05  5.89898432e-01  3.04746964e+00]
 [-1.80336055e-04  1.49020637e-05  6.88210389e-01 -1.37073445e+00]
 [ 7.72868809e-05 -2.14162212e-05 -2.94949923e-01 -2.31826961e+00]
 [-2.57622936e-05  2.66212007e-05  9.83174151e-02  1.62026031e+00]
 [ 5.15245873e-05  2.70050066e-05 -1.96629361e-01  2.79794378e+00]
 [-1.28811468e-04 -2.04620597e-06  4.91581563e-01  2.06283716e+00]
 [ 1.03049175e-04 -1.17432902e-05 -3.93261334e-01  2.73556231e+00]
 [ 5.15245873e-05  1.61824728e-06 -1.96633933e-01 -2.28707888e+00]
 [ 2.31860643e-04 -7.18783730e-05 -8.84843799e-01 -2.80716593e-01]
 [-2.57622936e-05 -2.81952952e-05  9.83156647e-02 -2.86623183e-01]
 [-1.54573762e-04  2.81912029e-06  5.89894977e-01 -7.66297353e-01]
 [ 1.80336055e-04 -3.31742290e-05 -6.88210972e-01  7.35106620e-01]
 [-2.06098349e-04  4.88144694e-05  7.86528379e-01  8.85153692e-01]
 [ 5.15245873e-05 -5.90843904e-06 -1.96629956e-01  2.16231595e+00]
 [ 2.31860643e-04 -4.24780716e-05 -8.84846053e-01 -2.82322792e+00]]
Input is:
[[  4  -1  -6  -7   8   4 -10  -1   6  -6  -1   7  -2   6  -1   9  -4 -10
   -1   8  -4  -4  -1   9  -6   3  -6  -9   2   3  -1 -10  -7  -4   8  -7
    0  -6   3  -1   1   7   5  -1  -7  -5   1  -3  -2  -8  -9  -8  -1  -6
   -4  -7   0   5  -3   0   0   1  -3   3]
 [ -5   5  -6   0   5  -9  -2  -1   9   8   4  -7  -9   5  -1   9  -5   5
    5   0  -4   8  -2   5   7   0  -1  -5   4   8  -9  -7  -2   6   5   7
   -2 -10   2  -5  -4   7  -8   9  -4   3   9  -7  -6  -5 -10   4  -7   8
   -9  -9   3  -1  -2   7   9  -2   0  -8]
 [ -1   9  -7   4   0  -6  -8  -5  -4   0   6   7   8 -10   1  -2   8   0
   -4   9  -8  -4   1  -6   8 -10  -6  -5  -4   7   6   0  -6  -1  -6  -3
    6  -5   7   7  -1  -3 -10  -2   5 -10   9  -7   8  -5  -3  -3  -1  -5
    4  -8  -4   8  -5   6  -4   6   0   3]
 [  3   5  -4  -8   0   7   2   8   1   0   0   8   0   3  -1   4  -8   6
    0 -10  -7 -10   6  -3   6   7   3  -5   4   5   6  -7  -3  -1  -1   0
```

```
  -4   5  -8   5  -6  -8  -6  -9   9   0   9   2  -2   9   9  -4   7  -4
   1  -2 -10   0  -2  -2  -1   5   5   0]
 [  5  -8   0  -8   5  -4  -3 -10 -10   6  -4  -3  -8   5  -5  -6  -1  -1
  -2  -1  -4  -5  -4   3  -3   5   3 -10   9   9   9   7   2  -6   7 -10
   2   1   4   4   1   2   9  -3  -8   7   0  -4  -9  -2   2   0  -5 -10
   3   0  -3  -3   5   8   7  -2  -7   8]]
label is:
[[0. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [0. 0. 0. 0. 0. 0. 0. 1. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 0. 1.]]
z is:
[[-1.         -1.         -1.         -1.        ]
 [ 0.99999999  0.92201828 -0.99868418 -1.        ]
 [-0.9999606  -1.         -0.99999999 -1.        ]
 [ 1.          1.          1.         -0.72656815]
 [-1.         -1.         -1.         -0.99999998]]
y is:
[[0.04446489 0.02145759 0.09062093 0.08562248 0.03344609 0.041988
  0.33878673 0.05756302 0.11184748 0.1742028 ]
 [0.02959632 0.05744928 0.10295018 0.0585812  0.04629935 0.10825399
  0.12309101 0.19403691 0.23095707 0.04878469]
 [0.04446485 0.02145802 0.09062072 0.08562181 0.03344669 0.04198865
  0.33878543 0.05756402 0.11184802 0.1742018 ]
 [0.08136967 0.12716391 0.06655972 0.0959836  0.07108672 0.15657118
  0.07184109 0.0962415  0.18867452 0.04450809]
 [0.04446489 0.02145759 0.09062093 0.08562248 0.03344609 0.041988
  0.33878673 0.05756302 0.11184748 0.1742028 ]]
GT is:
[[-1.15299773e-05 -1.53582008e-01  7.87928898e-03 -3.39133624e-01]
 [ 1.03622497e-04  1.53582008e-01 -7.87930364e-03 -5.65222835e-01]
 [-8.06029684e-05 -1.84298409e-01  9.45515737e-03  4.52178218e-01]
 [ 4.60468038e-05  0.00000000e+00 -7.54407460e-09  9.04356373e-01]
 [ 1.82314209e-08  1.53582008e-01 -7.87928708e-03  3.92322752e-08]
 [-6.91027959e-05 -2.76447614e-01  1.41827280e-02 -7.91311912e-01]
 [-9.21002661e-05 -6.14328030e-02  3.15172967e-03 -2.26089132e-01]
 [-5.75620614e-05 -3.07164015e-02  1.57586681e-03 -9.04356514e-01]
 [-4.60136713e-05  2.76447614e-01 -1.41827093e-02 -1.13044633e-01]
 [ 2.91701607e-08  2.45731212e-01 -1.26068593e-02  4.70787320e-08]
 [ 6.90842468e-05  1.22865606e-01 -6.30344076e-03 -3.13858128e-08]
 [ 8.05553858e-05 -2.15014811e-01  1.10309891e-02 -9.04356459e-01]
 [ 9.20600663e-05 -2.76447614e-01  1.41827019e-02 -6.27716412e-08]
 [-1.15098008e-04  1.53582008e-01 -7.87926853e-03 -3.39133624e-01]
 [ 1.15080092e-05 -3.07164015e-02  1.57585555e-03  1.13044515e-01]
 [-2.29905864e-05  2.76447614e-01 -1.41827130e-02 -4.52178265e-01]
 [ 9.20750144e-05 -1.53582008e-01  7.87927214e-03  9.04356428e-01]
 [ 1.79589495e-08  1.53582008e-01 -7.87928697e-03 -6.78267334e-01]
 [-4.60282104e-05  1.53582008e-01 -7.87927968e-03 -1.56929037e-08]
 [ 1.03604947e-04  0.00000000e+00 -1.68297288e-08  1.13044554e+00]
 [-9.21071504e-05 -1.22865606e-01  6.30344434e-03  7.91311850e-01]
 [-4.60168183e-05  2.45731212e-01 -1.26068521e-02  1.13044551e+00]
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 [ 1.15040455e-05 -6.14328030e-02  3.15171309e-03 -6.78267358e-01]
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 [ 9.21181341e-05  2.15014811e-01 -1.10310166e-02 -6.78267350e-01]
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 [-6.90734442e-05 -3.07164015e-02  1.57586857e-03 -3.39133640e-01]
 [-5.75760567e-05 -1.53582008e-01  7.87929624e-03  5.65222694e-01]
 [-4.60320374e-05  1.22865606e-01 -6.30342219e-03 -4.52178147e-01]
 [ 8.06102160e-05  2.45731212e-01 -1.26068722e-02 -5.65222702e-01]
 [ 6.90365744e-05 -2.76447614e-01  1.41827058e-02 -6.78267256e-01]
 [-2.52057111e-08 -2.15014811e-01  1.10310018e-02  7.91311936e-01]
 [-6.90768184e-05 -6.14328030e-02  3.15172588e-03  3.39133679e-01]
 [-1.14896880e-05  1.84298409e-01 -9.45514266e-03  1.13044507e-01]
 [-6.90513852e-05  1.53582008e-01 -7.87927600e-03  1.13044609e-01]
 [-3.45093080e-05  2.15014811e-01 -1.10309964e-02 -7.84645348e-08]
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 [ 8.05889280e-05  6.14328030e-02 -3.15172793e-03  9.04356467e-01]
 [ 8.05628148e-05 -1.53582008e-01  7.87927422e-03 -5.65222741e-01]
 [-1.15259231e-05 -1.22865606e-01  6.30343141e-03  6.78267334e-01]
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 [ 5.75430582e-05 -1.22865606e-01  6.30342058e-03 -1.01740105e+00]
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 [ 1.03636901e-04  2.76447614e-01 -1.41827332e-02 -1.01740099e+00]
 [-8.06068870e-05 -2.15014811e-01  1.10310149e-02 -2.26089140e-01]
 [ 9.20710956e-05 -1.84298409e-01  9.45512966e-03  2.26089038e-01]
 [-5.75766912e-05 -1.53582008e-01  7.87929649e-03 -1.01740101e+00]
 [-3.45717014e-05 -3.07164015e-01  1.57585799e-02 -1.01740097e+00]
 [-3.45200647e-05  1.22865606e-01 -6.30342419e-03  4.52178218e-01]
 [-1.15374517e-05 -2.15014811e-01  1.10310039e-02 -7.91311920e-01]
 [-5.75287011e-05  2.45731212e-01 -1.26068502e-02  4.52178139e-01]
 [ 4.60135802e-05 -2.76447614e-01  1.41827094e-02 -1.13044531e-01]
 [-9.21256081e-05 -2.76447614e-01  1.41827315e-02  2.26089109e-01]
 [-4.60350493e-05  9.21492046e-02 -4.72756503e-03  1.13044552e+00]
 [ 9.20892364e-05 -3.07164015e-02  1.57584262e-03 -2.35393633e-08]
 [-5.75652532e-05 -6.14328030e-02  3.15172405e-03  2.26089148e-01]
 [ 6.90952769e-05  2.15014811e-01 -1.10310130e-02  2.26089172e-01]
 [-4.60135796e-05  2.76447614e-01 -1.41827094e-02  1.13044609e-01]
 [ 6.90621428e-05 -6.14328030e-02  3.15170382e-03 -5.65222788e-01]
 [-2.27172319e-10  0.00000000e+00  9.02744259e-11 -5.65222827e-01]
 [ 3.45056617e-05 -2.45731212e-01  1.26068538e-02  6.27716257e-08]]
Your answer is:
[[-1.15299773e-05 -1.53582008e-01  7.87928898e-03 -3.39133624e-01]
 [ 1.03622497e-04  1.53582008e-01 -7.87930364e-03 -5.65222835e-01]
 [-8.06029684e-05 -1.84298409e-01  9.45515737e-03  4.52178218e-01]
 [ 4.60468038e-05  0.00000000e+00 -7.54407460e-09  9.04356373e-01]
 [ 1.82314209e-08  1.53582008e-01 -7.87928708e-03  3.92322752e-08]
 [-6.91027959e-05 -2.76447614e-01  1.41827280e-02 -7.91311912e-01]
 [-9.21002661e-05 -6.14328030e-02  3.15172967e-03 -2.26089132e-01]
 [-5.75620614e-05 -3.07164015e-02  1.57586681e-03 -9.04356514e-01]
 [-4.60136713e-05  2.76447614e-01 -1.41827093e-02 -1.13044633e-01]
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[2.91701607e-08 2.45731212e-01 -1.26068593e-02 4.70787320e-08]
[6.90842468e-05 1.22865606e-01 -6.30344076e-03 -3.13858128e-08]
[8.05553858e-05 -2.15014811e-01 1.10309891e-02 -9.04356459e-01]
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[9.20750144e-05 -1.53582008e-01 7.87927214e-03 9.04356428e-01]
[1.79589495e-08 1.53582008e-01 -7.87928697e-03 -6.78267334e-01]
[-4.60282104e-05 1.53582008e-01 -7.87927968e-03 -1.56929037e-08]
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[-9.21071504e-05 -1.22865606e-01 6.30344434e-03 7.91311850e-01]
[-4.60168183e-05 2.45731212e-01 -1.26068521e-02 1.13044551e+00]
[1.15040455e-05 -6.14328030e-02 3.15171309e-03 -6.78267358e-01]
[-6.90512947e-05 1.53582008e-01 -7.87927604e-03 3.39133687e-01]
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[-4.60320374e-05 1.22865606e-01 -6.30342219e-03 -4.52178147e-01]
[8.06102160e-05 2.45731212e-01 -1.26068722e-02 -5.65222702e-01]
[6.90365744e-05 -2.76447614e-01 1.41827058e-02 -6.78267256e-01]
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[-3.45093080e-05 2.15014811e-01 -1.10309964e-02 -7.84645348e-08]
[6.90625512e-05 -6.14328030e-02 3.15170366e-03 4.52178233e-01]
[-5.75947407e-05 -3.07164015e-01 1.57585835e-02 -5.65222764e-01]
[8.05889280e-05 6.14328030e-02 -3.15172793e-03 9.04356467e-01]
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[-1.15259231e-05 -1.22865606e-01 6.30343141e-03 6.78267334e-01]
[-3.45089445e-05 2.15014811e-01 -1.10309965e-02 9.04356451e-01]
[-1.15145001e-04 -2.45731212e-01 1.26068777e-02 6.78267397e-01]
[-2.29899966e-05 2.76447614e-01 -1.41827132e-02 1.01740097e+00]
[5.75430582e-05 -1.22865606e-01 6.30342058e-03 -1.01740105e+00]
[-1.15105164e-04 9.21492046e-02 -4.72755375e-03 5.49251816e-08]
[1.03636901e-04 2.76447614e-01 -1.41827332e-02 -1.01740099e+00]
[-8.06068870e-05 -2.15014811e-01 1.10310149e-02 -2.26089140e-01]
[9.20710956e-05 -1.84298409e-01 9.45512966e-03 2.26089038e-01]
[-5.75766912e-05 -1.53582008e-01 7.87929649e-03 -1.01740101e+00]
[-3.45717014e-05 -3.07164015e-01 1.57585799e-02 -1.01740097e+00]
[-3.45200647e-05 1.22865606e-01 -6.30342419e-03 4.52178218e-01]
[-1.15374517e-05 -2.15014811e-01 1.10310039e-02 -7.91311920e-01]
[-5.75287011e-05 2.45731212e-01 -1.26068502e-02 4.52178139e-01]
[4.60135802e-05 -2.76447614e-01 1.41827094e-02 -1.13044531e-01]
[-9.21256081e-05 -2.76447614e-01 1.41827315e-02 2.26089109e-01]
[-4.60350493e-05 9.21492046e-02 -4.72756503e-03 1.13044552e+00]
[9.20892364e-05 -3.07164015e-02 1.57584262e-03 -2.35393633e-08]
[-5.75652532e-05 -6.14328030e-02 3.15172405e-03 2.26089148e-01]
[6.90952769e-05 2.15014811e-01 -1.10310130e-02 2.26089172e-01]
[-4.60135796e-05 2.76447614e-01 -1.41827094e-02 1.13044609e-01]

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 [ 6.90621428e-05 -6.14328030e-02  3.15170382e-03 -5.65222788e-01]
 [-2.27172319e-10  0.00000000e+00  9.02744259e-11 -5.65222827e-01]
 [ 3.45056617e-05 -2.45731212e-01  1.26068538e-02  6.27716257e-08]]
Input is:
[[ -5   0  -3   5  -1   0  -5  -2  -2   1  -5   9   6   3   0  -4   5  -3
   -6 -10   1  -6  -8   4  -2   2   6  -2   6   1  -2  -7  -1   2 -10  -8
   -8  -9   7   6   1   0  -8   7  -2   1   4   7   5   5   3  -9  -2  -1
    5   2 -10  -4   7  -7  -9   3   5  -4]
 [  3  -4   2  -3  -5   3  -8   2   6  -7   3 -10   8   3   5  -1   3   5
    3  -4  -2   0 -10   5 -10   2   5   9  -8   5   0  -3   9  -4   0   4
   -6   2   6   3   2   5   4  -5   4 -10   7   5 -10 -10  -7  -2   1  -7
  -10   3  -8   1   1  -2   9  -3  -2   2]
 [ -4   0   2   7   4  -3  -3   1   1  -4   3   3  -7   6  -6  -4  -5  -2
    3   2   0  -1  -3   6 -10   5  -4   6   5   9  -1  -8 -10  -5   9   3
   -2  -2   4  -6   2  -4  -7 -10   6   4   6  -7  -3  -1 -10   7  -6   3
   -9  -2   7  -4   7  -4  -2   5  -2 -10]
 [ -8  -6  -9  -2  -4   0  -6   9   8   6  -3   8   5   4   9   9   9   8
   -9   6   0  -7   7  -9   4   3   6 -10   3   1   6  -7  -7   4  -7   5
    7   7   9  -4   6   7   2  -5  -4  -9  -5   0 -10   6  -2   1  -9   2
   -4 -10  -3   3   0   0   1  -3  -7   9]
 [ -3   5  -2   7  -3  -2 -10   5  -8   5   9   9   4 -10  -4  -1   3   3
   -4   9  -5 -10   3   6  -3  -1   3   9  -2   6   5   6  -5  -8   8   6
    6  -8   7   0  -8  -6   0  -6   2 -10   0   6  -5  -6  -7  -5   1  -9
    1 -10  -2   7   8   9  -2   3  -1   3]]
label is:
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 [0. 1. 0. 0. 0. 0. 0. 0. 0. 0.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 1. 0. 0. 0. 0. 0.]
 [0. 1. 0. 0. 0. 0. 0. 0. 0. 0.]]
z is:
[[-1.         -1.         -1.         -0.99902069]
 [-1.         -1.         -0.99621378 -1.        ]
 [-1.         -1.         -1.         -1.        ]
 [ 1.          0.15678735  1.          1.        ]
 [ 0.99998602 -1.          0.99993093 -0.99999719]]
y is:
[[0.14333212 0.09244485 0.03759172 0.06819864 0.16852642 0.03433434
  0.08234024 0.1102518  0.22053771 0.04244215]
 [0.14360821 0.09245651 0.03762331 0.06813836 0.1684833  0.03437773
  0.0823232  0.11022138 0.22037464 0.04239336]
 [0.14338189 0.09246757 0.03757926 0.06815983 0.16851982 0.03431526
  0.08236536 0.11025148 0.22054007 0.04241946]
 [0.14672082 0.03150464 0.16988885 0.06679224 0.10942429 0.25021494
  0.04562789 0.06538059 0.04937057 0.06507516]
 [0.37996639 0.03981386 0.08996168 0.02332603 0.08713457 0.14806187
  0.10527036 0.0572084  0.04979999 0.01945685]]
GT is:
[[-3.32391403e-05  2.15344921e+00  6.15066931e-04  2.52880838e-05]
 [ 5.53985679e-05  1.61508690e+00 -7.85658572e-04  6.04087392e-06]
 [-2.21594269e-05  2.42263036e+00  4.10044621e-04  1.49312153e-05]
 [ 7.75579969e-05  5.38362301e-01 -4.77344251e-04 -2.04553843e-05]
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[5.53985721e-05 -2.42263036e+00 6.51059311e-04 1.76059180e-05]
[-8.86377089e-05 -2.15344921e+00 1.16127252e-03 1.89964491e-06]
[5.53985658e-05 -1.61508690e+00 -1.50401751e-03 2.58351904e-07]
[9.97174294e-05 8.07543452e-01 1.02823497e-03 3.97861825e-05]
[9.97174203e-05 -2.15344921e+00 -2.08465377e-03 -4.11691219e-05]
[4.43188622e-05 -1.34590575e+00 2.05334652e-03 -2.98624291e-05]
[-1.10797139e-04 -1.07672460e+00 3.74052241e-04 -2.94293134e-05]
[-4.43188531e-05 -2.42263036e+00 1.05954222e-03 -4.83269890e-06]
[-1.10797149e-05 -2.42263036e+00 -2.73883651e-04 2.19219115e-05]
[3.32391446e-05 -2.42263036e+00 8.21650951e-04 -2.52880830e-05]
[3.32391460e-05 -2.15344921e+00 1.30055691e-03 2.09720902e-05]
[-4.43188545e-05 2.42263036e+00 5.80636261e-04 2.98624305e-05]
[9.97174245e-05 -1.61508690e+00 -6.47935892e-04 6.86987897e-05]
[-5.53985721e-05 -2.02801576e-13 -6.51059311e-04 -1.18233963e-05]
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[3.32391354e-05 -1.88426806e+00 -2.29123779e-03 4.98846963e-05]
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[2.11532565e-12 1.07672460e+00 7.18358941e-04 -3.46951293e-05]
[-8.86377118e-05 -1.61508690e+00 2.03460601e-04 -1.54479205e-05]
[-6.64782814e-05 -1.88426806e+00 9.90680882e-04 -7.24904868e-06]
[2.82043420e-12 -5.38362301e-01 9.57811922e-04 4.62601735e-05]
[-6.64782884e-05 1.34590575e+00 -1.40384892e-03 -4.77267013e-05]
[2.21594311e-05 1.07672460e+00 1.02667326e-03 1.39813935e-05]
[-1.10797149e-04 2.42263036e+00 -2.73883650e-03 -1.78642718e-05]
[4.93575985e-12 1.34590575e+00 1.67617086e-03 -2.31300855e-05]
[6.64782884e-05 -9.51964024e-12 1.40384892e-03 -3.32286013e-05]
[-5.53985778e-05 2.69181151e+00 -2.56668315e-03 -3.49534839e-05]
[-6.64782919e-05 -1.61508690e+00 -2.60111382e-03 -3.61616588e-05]
[-7.75580040e-05 5.38362301e-01 -1.91718555e-03 -2.58047900e-05]
[-5.53985721e-05 -2.69181151e-01 -6.51059311e-04 4.60018198e-05]
[1.10797149e-05 2.42263036e+00 2.73883650e-04 1.27732183e-05]
[-9.97174323e-05 -5.38362301e-01 -1.98604689e-03 -5.09105332e-06]
[1.10797071e-05 1.07672460e+00 -2.36009913e-03 -2.77044345e-05]
[-1.10797139e-04 2.69181151e+00 3.74052241e-04 -2.36467917e-05]

```
 [-2.21594339e-05  8.07543452e-01 -1.98448518e-03  5.54088653e-05]
 [ 7.75579997e-05 -8.07543452e-01  4.80467670e-04  3.15873108e-05]
 [ 8.86377139e-05 -7.81437094e-12  5.14898341e-04 -3.08122521e-05]
 [ 9.97174259e-05  8.24068826e-12 -1.69029931e-04  5.13512251e-05]
 [-2.21594219e-05 -2.69181151e-01  2.08621548e-03  4.96263460e-05]
 [ 3.32391403e-05  8.07543452e-01 -6.15066931e-04 -1.37230406e-05]
 [-1.10797156e-05  1.88426806e+00 -5.13336631e-04 -3.01207832e-05]
 [ 3.32391439e-05 -2.42263036e+00  5.82197971e-04  2.67546114e-05]]
Your answer is:
[[-3.32391403e-05  2.15344921e+00  6.15066931e-04  2.52880838e-05]
 [ 5.53985679e-05  1.61508690e+00 -7.85658572e-04  6.04087392e-06]
 [-2.21594269e-05  2.42263036e+00  4.10044621e-04  1.49312153e-05]
 [ 7.75579969e-05  5.38362301e-01 -4.77344251e-04 -2.04553843e-05]
 [-3.32391460e-05  1.07672460e+00 -1.30055691e-03  2.15799628e-06]
 [-2.21594262e-05 -1.27895198e-12  6.49497601e-04 -2.41634938e-06]
 [-1.10797147e-04  1.61508690e+00 -2.25993054e-03  1.68308581e-05]
 [ 5.53985721e-05 -2.42263036e+00  6.51059311e-04  1.76059180e-05]
 [-8.86377089e-05 -2.15344921e+00  1.16127252e-03  1.89964491e-06]
 [ 5.53985658e-05 -1.61508690e+00 -1.50401751e-03  2.58351904e-07]
 [ 9.97174294e-05  8.07543452e-01  1.02823497e-03  3.97861825e-05]
 [ 9.97174203e-05 -2.15344921e+00 -2.08465377e-03 -4.11691219e-05]
 [ 4.43188622e-05 -1.34590575e+00  2.05334652e-03 -2.98624291e-05]
 [-1.10797139e-04 -1.07672460e+00  3.74052241e-04 -2.94293134e-05]
 [-4.43188531e-05 -2.42263036e+00  1.05954222e-03 -4.83269890e-06]
 [-1.10797149e-05 -2.42263036e+00 -2.73883651e-04  2.19219115e-05]
 [ 3.32391446e-05 -2.42263036e+00  8.21650951e-04 -2.52880830e-05]
 [ 3.32391460e-05 -2.15344921e+00  1.30055691e-03  2.09720902e-05]
 [-4.43188545e-05  2.42263036e+00  5.80636261e-04  2.98624305e-05]
 [ 9.97174245e-05 -1.61508690e+00 -6.47935892e-04  6.86987897e-05]
 [-5.53985721e-05 -2.02801576e-13 -6.51059311e-04 -1.18233963e-05]
 [-1.10797141e-04  1.88426806e+00 -3.44306700e-04  2.26133808e-05]
 [ 3.32391354e-05 -1.88426806e+00 -2.29123779e-03  4.98846963e-05]
 [ 6.64782884e-05  2.42263036e+00  1.40384892e-03 -1.58810365e-05]
 [-3.32391495e-05 -1.07672460e+00 -2.49782181e-03  7.94051724e-06]
 [-1.10797127e-05 -8.07543452e-01  4.44475291e-04 -1.27732179e-05]
 [ 3.32391460e-05 -1.61508690e+00  1.30055691e-03 -3.10706044e-05]
 [ 9.97174337e-05  2.69181151e+00  2.46495285e-03  2.24386184e-05]
 [-2.21594339e-05 -8.07543452e-01 -1.98448518e-03 -3.71114806e-05]
 [ 6.64782884e-05 -2.69181151e-01  1.40384892e-03  1.46652839e-06]
 [ 5.53985707e-05 -1.61508690e+00  1.72153350e-04  1.76059177e-05]
 [ 6.64782828e-05  1.88426806e+00 -5.11774922e-04  4.77267003e-05]
 [-5.53985644e-05  1.88426806e+00  1.98292347e-03 -2.58351639e-07]
 [-8.86377160e-05 -1.07672460e+00 -1.23325728e-03 -2.12304429e-05]
 [ 8.86377132e-05  1.88426806e+00  2.75445360e-04  6.74906153e-05]
 [ 6.64782877e-05 -1.34590575e+00  1.16439594e-03  5.35092228e-05]
 [ 6.64782807e-05 -1.88426806e+00 -1.23013386e-03  5.35092215e-05]
 [-8.86377118e-05 -1.88426806e+00  2.03460601e-04  4.23772957e-05]
 [ 7.75580033e-05 -2.42263036e+00  1.67773257e-03 -3.20204263e-05]
 [ 2.11532565e-12  1.07672460e+00  7.18358941e-04 -3.46951293e-05]
 [-8.86377118e-05 -1.61508690e+00  2.03460601e-04 -1.54479205e-05]
 [-6.64782814e-05 -1.88426806e+00  9.90680882e-04 -7.24904868e-06]
 [ 2.82043420e-12 -5.38362301e-01  9.57811922e-04  4.62601735e-05]
```

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 [-6.64782884e-05  1.34590575e+00 -1.40384892e-03 -4.77267013e-05]
 [ 2.21594311e-05  1.07672460e+00  1.02667326e-03  1.39813935e-05]
 [-1.10797149e-04  2.42263036e+00 -2.73883650e-03 -1.78642718e-05]
 [ 4.93575985e-12  1.34590575e+00  1.67617086e-03 -2.31300855e-05]
 [ 6.64782884e-05 -9.51964024e-12  1.40384892e-03 -3.32286013e-05]
 [-5.53985778e-05  2.69181151e+00 -2.56668315e-03 -3.49534839e-05]
 [-6.64782919e-05 -1.61508690e+00 -2.60111382e-03 -3.61616588e-05]
 [-7.75580040e-05  5.38362301e-01 -1.91718555e-03 -2.58047900e-05]
 [-5.53985721e-05 -2.69181151e-01 -6.51059311e-04  4.60018198e-05]
 [ 1.10797149e-05  2.42263036e+00  2.73883650e-04  1.27732183e-05]
 [-9.97174323e-05 -5.38362301e-01 -1.98604689e-03 -5.09105332e-06]
 [ 1.10797071e-05  1.07672460e+00 -2.36009913e-03 -2.77044345e-05]
 [-1.10797139e-04  2.69181151e+00  3.74052241e-04 -2.36467917e-05]
 [-2.21594339e-05  8.07543452e-01 -1.98448518e-03  5.54088653e-05]
 [ 7.75579997e-05 -8.07543452e-01  4.80467670e-04  3.15873108e-05]
 [ 8.86377139e-05 -7.81437094e-12  5.14898341e-04 -3.08122521e-05]
 [ 9.97174259e-05  8.24068826e-12 -1.69029931e-04  5.13512251e-05]
 [-2.21594219e-05 -2.69181151e-01  2.08621548e-03  4.96263460e-05]
 [ 3.32391403e-05  8.07543452e-01 -6.15066931e-04 -1.37230406e-05]
 [-1.10797156e-05  1.88426806e+00 -5.13336631e-04 -3.01207832e-05]
 [ 3.32391439e-05 -2.42263036e+00  5.82197971e-04  2.67546114e-05]]
Input is:
[[ -6  -8  -5  -8  -6  -4  -3   6  -3   7   9   4  -7  -5  -1  -6  -2   3
   -5  -1   7   7   8  -8   9  -1  -7   9  -3  -4  -7   5  -9  -9   9  -6
   -4  -4  -8   2   1  -3   2   1   5   9  -9  -8   7  -9  -8   9  -8   4
    5   2   3   2   4  -1 -10   5  -4  -3]
 [  9   1 -10   5 -10  -2   2   2  -4   7   5  -5  -2  -3  -4  -6   3   4
   -7  -1  -4  -8   4  -3   2  -5   2   6  -3   2  -1  -4  -6  -3  -2   0
   -7  -7   0 -10  -3   1  -3   7   5  -5  -3  -2   2   5   8  -5   8   9
   -7  -2  -6  -9   2  -5  -7  -7  -9  -9]
 [ -7  -6   4  -7   4   1   2  -8  -9   3   4 -10   8   0   3   8   0   3
    2   1   9  -6  -4   6   5   5   4  -1  -8  -1  -7  -3   0  -4   0  -6
    2   5  -8   4  -3  -9  -2 -10 -10   5   3   8  -3   8  -1   5  -9   7
   -6   0   1   0  -4   2  -6   1  -1   4]
 [ -7  -3   6   0   0   0  -4   7  -8   7  -8  -3   8 -10   5  -3   7   7
   -1   3   2 -10  -7   6   4   4   2  -5   5   7  -1   7  -3  -7  -7 -10
    9  -6  -2  -3   6   0 -10  -9  -9   2   8   6  -7   7  -9   8  -4   1
   -8   9  -7   5   5  -2  -5   0 -10  -3]
 [ -1   5  -8  -3   4  -1   2   0   6  -4  -2   6   3  -7   2   3  -4   2
    3   0   5   4   6  -6  -1  -6   2   3  -8  -8  -1  -4  -6   3   2  -5
   -9   0   9   7   8   5  -8  -5   0   4   7   9   0  -2  -4  -8   3  -4
    9   8  -5  -1   1  -8 -10  -3  -3  -8]]
label is:
[[1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 1. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 1. 0. 0.]
 [0. 1. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 1. 0. 0. 0. 0. 0. 0. 0. 0.]]
z is:
[[-1.         -1.         -1.         -1.        ]
 [-1.         -1.         -1.         -1.        ]
 [-0.99992726 -1.         -0.96772409 -1.        ]
```

```
 [-1.         -1.         -1.         -1.        ]
 [-0.99999994 -0.99999736 -1.          0.99999927]]
y is:
[[0.07619916 0.09100037 0.19294641 0.04100589 0.04637947 0.11628265
  0.211066   0.07071046 0.13160805 0.02280155]
 [0.07619916 0.09100037 0.19294641 0.04100589 0.04637947 0.11628265
  0.211066   0.07071046 0.13160805 0.02280155]
 [0.07640484 0.09237273 0.19218925 0.04156087 0.04673683 0.11655703
  0.20953142 0.0709479  0.1306137  0.02308545]
 [0.07619916 0.09100037 0.19294641 0.04100589 0.04637947 0.11628265
  0.211066   0.07071046 0.13160805 0.02280155]
 [0.08205531 0.15058644 0.07076305 0.06346321 0.0203299  0.12438714
  0.2328917  0.02994887 0.18807167 0.03750271]]
GT is:
[[ 3.50546884e-05 -4.52656476e-07  4.57413487e-02  2.84336393e-07]
 [ 3.01567721e-05  2.26328243e-06  3.92068503e-02 -1.42675940e-06]
 [-2.01920745e-05 -3.62125188e-06 -2.61378853e-02  2.28407881e-06]
 [ 3.50171628e-05 -1.35796945e-06  4.57413543e-02  8.55204808e-07]
 [-1.99669209e-05  1.81062593e-06 -2.61379244e-02 -1.13911384e-06]
 [-5.02925582e-06 -4.52656486e-07 -6.53447442e-03  2.86167563e-07]
 [-9.98346045e-06  9.05312967e-07 -1.30689616e-02 -5.69556922e-07]
 [ 4.00839442e-05  1.04045996e-14  5.22758210e-02 -3.07291638e-09]
 [ 4.52070140e-05  2.71593892e-06  5.88102810e-02 -1.71361759e-06]
 [-1.51065303e-05 -1.81062594e-06 -1.96034210e-02  1.14083253e-06]
 [-2.00794977e-05 -9.05312975e-07 -2.61379032e-02  5.70231817e-07]
 [ 5.02175070e-05  2.71593892e-06  6.53447580e-02 -1.71497182e-06]
 [-4.00276558e-05  1.35796944e-06 -5.22758333e-02 -8.52608833e-07]
 [-1.31339602e-07 -3.16859539e-06  2.48700755e-08  1.99772902e-06]
 [-1.49939535e-05  9.05312966e-07 -1.96034407e-02 -5.69599658e-07]
 [-4.00276558e-05  1.35796944e-06 -5.22758316e-02 -8.52764051e-07]
 [-7.50512012e-08 -1.81062594e-06  1.22796513e-08  1.14142639e-06]
 [-1.49939535e-05  9.05312966e-07 -1.96034410e-02 -5.70220531e-07]
 [-9.96469765e-06  1.35796945e-06 -1.30689654e-02 -8.54525474e-07]
 [-5.01049302e-06 -1.30057494e-15 -6.53447822e-03  4.22919122e-10]
 [-4.50006232e-05  2.26328241e-06 -5.88103168e-02 -1.42507217e-06]
 [ 3.01380093e-05  1.81062595e-06  3.92068547e-02 -1.14380869e-06]
 [ 2.01545489e-05  2.71593891e-06  2.61378921e-02 -1.71398648e-06]
 [-3.01755349e-05 -2.71593892e-06 -3.92068475e-02  1.71452189e-06]
 [-2.50712279e-05 -4.52656491e-07 -3.26723861e-02  2.85220529e-07]
 [-2.51650419e-05 -2.71593891e-06 -3.26723694e-02  1.71316766e-06]
 [-2.00044465e-05  9.05312964e-07 -2.61379180e-02 -5.68400647e-07]
 [ 5.06678143e-06  1.35796946e-06  6.53446851e-03 -8.57501633e-07]
 [ 3.99338418e-05 -3.62125187e-06  5.22758480e-02  2.28055596e-06]
 [ 4.86039062e-06 -3.62125188e-06  6.53450338e-03  2.28258509e-06]
 [ 3.50546884e-05 -4.52656476e-07  4.57413478e-02  2.84491611e-07]
 [ 1.49564279e-05 -1.81062593e-06  1.96034456e-02  1.13953676e-06]
 [-1.12576802e-07 -2.71593891e-06  2.04706795e-08  1.71307090e-06]
 [ 2.00982605e-05  1.35796946e-06  2.61379021e-02 -8.55510806e-07]
 [ 3.75256006e-08  9.05312969e-07 -5.60803240e-09 -5.71954943e-07]
 [ 2.99691441e-05 -2.26328242e-06  3.92068848e-02  1.42572005e-06]
 [-1.01898513e-05 -4.07390836e-06 -1.30689269e-02  2.56866718e-06]
 [-2.50524651e-05 -6.50287472e-15 -3.26723879e-02  1.95937731e-09]
```

```
 [ 4.02528094e-05  4.07390837e-06  5.22757924e-02 -2.56841076e-06]
 [-1.99106325e-05  3.16859539e-06 -2.61379339e-02 -1.99619256e-06]
 [ 1.51815815e-05  3.62125188e-06  1.96034057e-02 -2.28319023e-06]
 [ 4.51882512e-05  2.26328244e-06  5.88102832e-02 -1.42833860e-06]
 [ 9.87088365e-06 -3.62125188e-06  1.30689837e-02  2.28138607e-06]
 [ 5.00111162e-05 -2.26328241e-06  6.53447956e-02  1.42356272e-06]
 [ 5.01049302e-05  1.30057494e-14  6.53447790e-02 -3.45309973e-09]
 [-2.49774139e-05  1.81062593e-06 -3.26724024e-02 -1.14117442e-06]
 [-1.49001395e-05  3.16859539e-06 -1.96034578e-02 -1.99475286e-06]
 [-3.99150790e-05  4.07390835e-06 -5.22758530e-02 -2.56412755e-06]
 [ 1.50314791e-05  3.90172483e-15  1.96034343e-02 -1.88963056e-09]
 [-4.01214698e-05 -9.05312980e-07 -5.22758165e-02  5.74096550e-07]
 [ 4.93544182e-06 -1.81062594e-06  6.53449247e-03  1.14209000e-06]
 [-2.52025675e-05 -3.62125188e-06 -3.26723633e-02  2.28217345e-06]
 [ 4.51507256e-05  1.35796947e-06  5.88102904e-02 -8.57004528e-07]
 [-3.51485024e-05 -1.81062595e-06 -4.57413311e-02  1.14236899e-06]
 [ 3.02318233e-05  4.07390837e-06  3.92068378e-02 -2.56989320e-06]
 [ 1.50102402e-07  3.62125188e-06 -2.80539440e-08 -2.28254235e-06]
[...(truncated)...]-6.11402299e-11  7.59737253e-10 -1.51882818e+00]
 [ 4.77910699e-04 -6.87827586e-11  8.54707049e-10  1.80203674e-01]
 [ 7.96517102e-04 -7.64252873e-12  9.49632998e-11  6.95951447e-01]
 [ 1.43372925e-03  6.11402299e-11 -7.59738877e-10 -1.15486893e+00]
 [ 4.66924048e-11 -6.87827586e-11  8.54703801e-10 -1.35638397e+00]
 [ 4.77910389e-04 -1.52850575e-11  1.89936343e-10  5.19299665e-01]
 [-3.18607351e-04  3.82126437e-11 -4.74832738e-10 -8.54843764e-01]
 [-1.11512311e-03 -2.29275862e-11  2.84898019e-10  4.83780738e-01]
 [ 4.77910458e-04  0.00000000e+00  1.62396704e-15  1.02794365e+00]
 [ 9.55820211e-04  3.82126437e-11 -4.74838152e-10  1.03859933e+00]
 [ 9.55820525e-04  0.00000000e+00 -5.41322345e-16  1.03859933e+00]
 [ 1.59303989e-04 -6.11402299e-11  7.59738336e-10  3.42647884e-01]
 [-1.11512265e-03 -2.29275862e-11  2.84901267e-10  1.67061671e+00]
 [-1.27442615e-03 -6.11402299e-11  7.59739960e-10  4.80228845e-01]
 [ 1.11512393e-03 -5.34977011e-11  6.64767458e-10  2.48632495e-02]
 [-3.18607481e-04  3.82126437e-11 -4.74834362e-10 -1.19393976e+00]
 [-1.11512259e-03 -4.58551724e-11  5.69806323e-10  1.33152072e+00]
 [ 1.59303811e-04  0.00000000e+00 -4.33057876e-15  1.19038786e+00]
 [-2.69953874e-10 -3.82126437e-11  4.74831115e-10 -1.52593196e+00]
 [ 9.55820594e-04  1.52850575e-11 -1.89936885e-10  1.54724332e+00]
 [ 4.87212891e-11 -6.11402299e-11  7.59738877e-10 -1.18683597e+00]
 [ 1.59303253e-03  5.34977011e-11 -6.64770706e-10 -1.49041303e+00]
 [ 1.11512388e-03  0.00000000e+00  0.00000000e+00  1.04215122e+00]
 [-7.96516761e-04  6.87827586e-11 -8.54699471e-10  1.50817250e+00]
 [ 3.18607739e-04 -4.58551724e-11  5.69805241e-10  1.70258374e+00]
 [ 9.55820576e-04 -5.34977011e-11  6.64770706e-10  2.13113567e-02]
 [ 9.58054372e-10 -6.11402299e-11  7.59736171e-10  1.18683597e+00]
 [ 4.77909240e-04  6.11402299e-11 -7.59734006e-10 -8.37084300e-01]]
Your answer is:
[[-5.68368261e-11  3.05701149e-11 -3.79867815e-10  5.08643987e-01]
 [ 1.59302836e-04  0.00000000e+00  4.33057876e-15 -1.35283207e+00]
 [ 1.59303342e-03 -4.58551724e-11  5.69805241e-10 -1.32086504e+00]
 [-3.18606919e-04 -4.58551724e-11  5.69803617e-10 -1.53303575e+00]
 [-1.17731421e-10  4.58551724e-11 -5.69803075e-10  6.78191983e-01]
```

[3.18606592e-04 3.82126437e-11 -4.74835445e-10 5.15747773e-01]
[-4.77910188e-04 3.82126437e-11 -4.74830032e-10 4.97988309e-01]
[-1.11512426e-03 5.34977011e-11 -6.64772871e-10 -8.72603228e-01]
[4.77909873e-04 0.00000000e+00 4.33057876e-15 -4.97988309e-01]
[4.77910711e-04 -2.29275862e-11 2.84900184e-10 1.19749165e+00]
[1.59303292e-03 5.34977011e-11 -6.64770164e-10 -4.73125059e-01]
[-1.11512355e-03 3.82126437e-11 -4.74830032e-10 6.53328733e-01]
[1.59303402e-03 7.64252873e-12 -9.49638411e-11 1.39190289e+00]
[-6.37213665e-04 6.87827586e-11 -8.54698388e-10 8.33532407e-01]
[4.77910455e-04 -7.64252873e-12 9.49725022e-11 8.58395657e-01]
[1.59303374e-04 6.87827586e-11 -8.54698388e-10 1.52948385e+00]
[-1.11512247e-03 -6.87827586e-11 8.54702177e-10 1.16197272e+00]
[-4.77909430e-04 -4.58551724e-11 5.69807406e-10 6.67536304e-01]
[6.37213615e-04 -1.52850575e-11 1.89934178e-10 1.83755567e-01]
[-1.27442601e-03 -3.05701149e-11 3.79865649e-10 1.49751682e+00]
[-9.56025488e-10 6.87827586e-11 -8.54706508e-10 -1.01728797e+00]
[-1.43372989e-03 -3.82126437e-11 4.74831115e-10 -3.19670350e-02]
[-1.27442793e-03 6.87827586e-11 -8.54701095e-10 -1.38479911e+00]
[-6.37213493e-04 -1.52850575e-11 1.89934719e-10 -5.22851558e-01]
[1.59303325e-03 6.87827586e-11 -8.54704884e-10 7.13710911e-01]
[1.59303337e-03 7.64252873e-12 -9.49660064e-11 -3.03577064e-01]
[-6.37213369e-04 -3.82126437e-11 4.74834904e-10 -6.92399554e-01]
[7.96516956e-04 -6.87827586e-11 8.54706508e-10 -9.99528510e-01]
[1.59303740e-04 -2.29275862e-11 2.84896395e-10 5.12195880e-01]
[-1.27442633e-03 0.00000000e+00 2.70661173e-15 1.32796882e+00]
[3.18607223e-04 -3.05701149e-11 3.79864567e-10 6.85295768e-01]
[-6.37213667e-04 6.11402299e-11 -7.59738877e-10 6.63984412e-01]
[-9.55820343e-04 -4.58551724e-11 5.69806323e-10 -1.54724332e+00]
[6.37214189e-04 -5.34977011e-11 6.64773412e-10 8.61947550e-01]
[1.43373059e-03 -7.64252873e-12 9.49649237e-11 8.79707013e-01]
[-9.55820716e-04 1.52850575e-11 -1.89936885e-10 -1.20814733e+00]
[3.18606631e-04 -6.11402299e-11 7.59737253e-10 -1.51882818e+00]
[4.77910699e-04 -6.87827586e-11 8.54707049e-10 1.80203674e-01]
[7.96517102e-04 -7.64252873e-12 9.49632998e-11 6.95951447e-01]
[1.43372925e-03 6.11402299e-11 -7.59738877e-10 -1.15486893e+00]
[4.66924048e-11 -6.87827586e-11 8.54703801e-10 -1.35638397e+00]
[4.77910389e-04 -1.52850575e-11 1.89936343e-10 5.19299665e-01]
[-3.18607351e-04 3.82126437e-11 -4.74832738e-10 -8.54843764e-01]
[-1.11512311e-03 -2.29275862e-11 2.84898019e-10 4.83780738e-01]
[4.77910458e-04 0.00000000e+00 1.62396704e-15 1.02794365e+00]
[9.55820211e-04 3.82126437e-11 -4.74838152e-10 1.03859933e+00]
[9.55820525e-04 0.00000000e+00 -5.41322345e-16 1.03859933e+00]
[1.59303989e-04 -6.11402299e-11 7.59738336e-10 3.42647884e-01]
[-1.11512265e-03 -2.29275862e-11 2.84901267e-10 1.67061671e+00]
[-1.27442615e-03 -6.11402299e-11 7.59739960e-10 4.80228845e-01]
[1.11512393e-03 -5.34977011e-11 6.64767458e-10 2.48632495e-02]
[-3.18607481e-04 3.82126437e-11 -4.74834362e-10 -1.19393976e+00]
[-1.11512259e-03 -4.58551724e-11 5.69806323e-10 1.33152072e+00]
[1.59303811e-04 0.00000000e+00 -4.33057876e-15 1.19038786e+00]
[-2.69953874e-10 -3.82126437e-11 4.74831115e-10 -1.52593196e+00]
[9.55820594e-04 1.52850575e-11 -1.89936885e-10 1.54724332e+00]
[4.87212891e-11 -6.11402299e-11 7.59738877e-10 -1.18683597e+00]

```
 [ 1.59303253e-03  5.34977011e-11 -6.64770706e-10 -1.49041303e+00]
 [ 1.11512388e-03  0.00000000e+00  0.00000000e+00  1.04215122e+00]
 [-7.96516761e-04  6.87827586e-11 -8.54699471e-10  1.50817250e+00]
 [ 3.18607739e-04 -4.58551724e-11  5.69805241e-10  1.70258374e+00]
 [ 9.55820576e-04 -5.34977011e-11  6.64770706e-10  2.13113567e-02]
 [ 9.58054372e-10 -6.11402299e-11  7.59736171e-10  1.18683597e+00]
 [ 4.77909240e-04  6.11402299e-11 -7.59734006e-10 -8.37084300e-01]]
Input is:
[[ -8   1 -10  -5  -9  -9   4  -4  -6   6  -2  -9  -1   5  -2  -3   9   0
    5   3  -2  -6  -1  -2   6   2  -9   4   7   6  -8  -4  -2  -3   5  -3
   -2   0 -10   8   4 -10   1  -3  -5   1  -7  -3   3  -3  -3   4   7   2
    7  -4   0  -2  -6   6  -9   3 -10 -10]
 [  2  -2  -7  -6  -2  -7   0  -2  -7  -5   4  -7   4  -5   4 -10  -8   0
   -2   4  -5  -9   4   2   7   2   9   0  -1  -4   4  -3   6  -2  -5  -4
   -3   2   7   8   5   5  -8  -7   7  -3  -5   3  -3  -9  -1  -2  -7   2
  -10  -3  -2  -8  -9   7  -5   2  -5  -1]
 [  8  -4  -5  -3  -7   9  -4   9  -9   8  -9   3  -6   1   5   2  -4  -9
    5   6   0  -5   4   5   7   3  -1  -8 -10  -2  -1   4  -4  -1   8   7
   -5   3   7  -6   8  -7   2   3  -7 -10  -3   0   9   4 -10   0   3   0
    6   5  -2   5   5   8   2   1  -9  -1]
 [  3   9  -5   2  -9   0  -7  -2  -4   2   9   5  -7  -5  -7  -2  -5  -9
   -7   4  -5   9  -7  -8 -10   7   0  -8   6   2  -8  -1   0  -1  -2   0
   -1  -1  -3   3 -10  -6  -6  -8   9   1   0 -10   7   4   6   7   3   6
    1   5  -7  -2  -2  -6  -3   2   0   6]
 [  3   0   2  -8   9  -5  -3  -2   5   3  -3   6  -1  -6   7   8   3   6
   -5   5   6  -3  -1  -4  -8   0   1   2  -4   2   0  -3   4  -2   9   4
  -10  -3   3  -6   8  -4  -2  -8   6  -8   3  -1  -7   9   1  -6  -7  -9
   -9  -8  -8   1  -8   8  -1   7   6   2]]
label is:
[[0. 0. 0. 0. 1. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 1. 0. 0.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 1. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 0. 1.]]
z is:
[[-1.         -1.         -1.         -1.        ]
 [-1.         -1.         -1.         -1.        ]
 [ 1.          0.99813337  1.          0.99677198]
 [-1.         -1.         -1.         -1.        ]
 [-0.9999999  -1.         -1.         -1.        ]]
y is:
[[0.0831648  0.07670611 0.04284693 0.06200871 0.08982368 0.16569408
  0.13449845 0.026393   0.22947148 0.08939277]
 [0.0831648  0.07670611 0.04284693 0.06200871 0.08982368 0.16569408
  0.13449845 0.026393   0.22947148 0.08939277]
 [0.15490353 0.13710569 0.08922575 0.05453113 0.08500936 0.0695119
  0.02962364 0.28434486 0.02879993 0.06694421]
 [0.0831648  0.07670611 0.04284693 0.06200871 0.08982368 0.16569408
  0.13449845 0.026393   0.22947148 0.08939277]
 [0.0831648  0.0767061  0.04284693 0.0620087  0.08982368 0.16569408
  0.13449845 0.026393   0.22947148 0.08939277]]
GT is:
```

```
[[-6.21984758e-08  4.10335917e-03  0.00000000e+00 -5.69829167e-03]
 [ 0.00000000e+00 -2.05167958e-03  0.00000000e+00  2.84914583e-03]
 [-4.14656506e-08 -2.56459946e-03  0.00000000e+00  3.56143227e-03]
 [ 1.65862602e-07 -1.53875972e-03  0.00000000e+00  2.13685942e-03]
 [-1.86595428e-07 -3.59043922e-03  0.00000000e+00  4.98600514e-03]
 [ 1.03664126e-07  4.61627903e-03  0.00000000e+00 -6.41057808e-03]
 [ 6.21984758e-08 -2.05167959e-03  0.00000000e+00  2.84914585e-03]
 [ 4.14656506e-08  4.61627904e-03  0.00000000e+00 -6.41057810e-03]
 [-1.03664126e-07 -4.61627903e-03  0.00000000e+00  6.41057808e-03]
 [-6.21984758e-08  4.10335917e-03  0.00000000e+00 -5.69829167e-03]
 [ 6.21984758e-08 -4.61627906e-03  0.00000000e+00  6.41057813e-03]
 [-1.24396952e-07  1.53875971e-03  0.00000000e+00 -2.13685941e-03]
 [ 2.07328253e-08 -3.07751937e-03  0.00000000e+00  4.27371875e-03]
 [ 1.24396952e-07  5.12919866e-04  0.00000000e+00 -7.12286418e-04]
 [-1.45129777e-07  2.56459950e-03  0.00000000e+00 -3.56143233e-03]
 [-1.65862602e-07  1.02583983e-03  0.00000000e+00 -1.42457297e-03]
 [-6.21984758e-08 -2.05167956e-03  0.00000000e+00  2.84914581e-03]
 [-1.24396952e-07 -4.61627902e-03  0.00000000e+00  6.41057807e-03]
 [ 1.03664126e-07  2.56459945e-03  0.00000000e+00 -3.56143225e-03]
 [-1.03664126e-07  3.07751939e-03  0.00000000e+00 -4.27371877e-03]
 [-1.24396952e-07  2.78741648e-11  0.00000000e+00 -3.93299855e-11]
 [ 6.21984758e-08 -2.56459949e-03  0.00000000e+00  3.56143230e-03]
 [ 2.07328253e-08  2.05167957e-03  0.00000000e+00 -2.84914582e-03]
 [ 8.29313011e-08  2.56459945e-03  0.00000000e+00 -3.56143226e-03]
 [ 1.65862602e-07  3.59043922e-03  0.00000000e+00 -4.98600515e-03]
 [ 0.00000000e+00  1.53875968e-03  0.00000000e+00 -2.13685937e-03]
 [-2.07328253e-08 -5.12919890e-04  0.00000000e+00  7.12286450e-04]
 [-4.14656506e-08 -4.10335915e-03  0.00000000e+00  5.69829164e-03]
 [ 8.29313011e-08 -5.12919896e-03  0.00000000e+00  7.12286459e-03]
 [-4.14656506e-08 -1.02583978e-03  0.00000000e+00  1.42457290e-03]
 [ 0.00000000e+00 -5.12919894e-04  0.00000000e+00  7.12286457e-04]
 [ 6.21984758e-08  2.05167956e-03  0.00000000e+00 -2.84914581e-03]
 [-8.29313011e-08 -2.05167956e-03  0.00000000e+00  2.84914580e-03]
 [ 4.14656506e-08 -5.12919904e-04  0.00000000e+00  7.12286470e-04]
 [-1.86595428e-07  4.10335920e-03  0.00000000e+00 -5.69829171e-03]
 [-8.29313011e-08  3.59043928e-03  0.00000000e+00 -4.98600522e-03]
 [ 2.07328253e-07 -2.56459952e-03  0.00000000e+00  3.56143235e-03]
 [ 6.21984758e-08  1.53875967e-03  0.00000000e+00 -2.13685935e-03]
 [-6.21984758e-08  3.59043927e-03  0.00000000e+00 -4.98600522e-03]
 [ 1.24396952e-07 -3.07751939e-03  0.00000000e+00  4.27371878e-03]
 [-1.65862602e-07  4.10335919e-03  0.00000000e+00 -5.69829171e-03]
 [ 8.29313011e-08 -3.59043928e-03  0.00000000e+00  4.98600522e-03]
 [ 4.14656506e-08  1.02583978e-03  0.00000000e+00 -1.42457290e-03]
 [ 1.65862602e-07  1.53875965e-03  0.00000000e+00 -2.13685932e-03]
 [-1.24396952e-07 -3.59043923e-03  0.00000000e+00  4.98600516e-03]
 [ 1.65862602e-07 -5.12919898e-03  0.00000000e+00  7.12286462e-03]
 [-6.21984758e-08 -1.53875967e-03  0.00000000e+00  2.13685935e-03]
 [ 2.07328253e-08 -4.64569413e-12  0.00000000e+00  6.55499759e-12]
 [ 1.45129777e-07  4.61627902e-03  0.00000000e+00 -6.41057807e-03]
 [-1.86595428e-07  2.05167962e-03  0.00000000e+00 -2.84914589e-03]
 [-2.07328253e-08 -5.12919894e-03  0.00000000e+00  7.12286456e-03]
 [ 1.24396952e-07 -2.78741648e-11  0.00000000e+00  3.93299855e-11]
```

```
 [ 1.45129777e-07  1.53875965e-03  0.00000000e+00 -2.13685932e-03]
 [ 1.86595428e-07 -4.18112471e-11  0.00000000e+00  5.89949783e-11]
 [ 1.86595428e-07  3.07751932e-03  0.00000000e+00 -4.27371868e-03]
 [ 1.65862602e-07  2.56459943e-03  0.00000000e+00 -3.56143223e-03]
 [ 1.65862602e-07 -1.02583983e-03  0.00000000e+00  1.42457297e-03]
 [-2.07328253e-08  2.56459948e-03  0.00000000e+00 -3.56143229e-03]
 [ 1.65862602e-07  2.56459943e-03  0.00000000e+00 -3.56143223e-03]
 [-1.65862602e-07  4.10335919e-03  0.00000000e+00 -5.69829171e-03]
 [ 2.07328253e-08  1.02583978e-03  0.00000000e+00 -1.42457291e-03]
 [-1.45129777e-07  5.12919927e-04  0.00000000e+00 -7.12286503e-04]
 [-1.24396952e-07 -4.61627902e-03  0.00000000e+00  6.41057807e-03]
 [-4.14656506e-08 -5.12919885e-04  0.00000000e+00  7.12286444e-04]]
Your answer is:
[[-6.21984758e-08  4.10335917e-03  0.00000000e+00 -5.69829167e-03]
 [ 0.00000000e+00 -2.05167958e-03  0.00000000e+00  2.84914583e-03]
 [-4.14656506e-08 -2.56459946e-03  0.00000000e+00  3.56143227e-03]
 [ 1.65862602e-07 -1.53875972e-03  0.00000000e+00  2.13685942e-03]
 [-1.86595428e-07 -3.59043922e-03  0.00000000e+00  4.98600514e-03]
 [ 1.03664126e-07  4.61627903e-03  0.00000000e+00 -6.41057808e-03]
 [ 6.21984758e-08 -2.05167959e-03  0.00000000e+00  2.84914585e-03]
 [ 4.14656506e-08  4.61627904e-03  0.00000000e+00 -6.41057810e-03]
 [-1.03664126e-07 -4.61627903e-03  0.00000000e+00  6.41057808e-03]
 [-6.21984758e-08  4.10335917e-03  0.00000000e+00 -5.69829167e-03]
 [ 6.21984758e-08 -4.61627906e-03  0.00000000e+00  6.41057813e-03]
 [-1.24396952e-07  1.53875971e-03  0.00000000e+00 -2.13685941e-03]
 [ 2.07328253e-08 -3.07751937e-03  0.00000000e+00  4.27371875e-03]
 [ 1.24396952e-07  5.12919866e-04  0.00000000e+00 -7.12286418e-04]
 [-1.45129777e-07  2.56459950e-03  0.00000000e+00 -3.56143233e-03]
 [-1.65862602e-07  1.02583983e-03  0.00000000e+00 -1.42457297e-03]
 [-6.21984758e-08 -2.05167956e-03  0.00000000e+00  2.84914581e-03]
 [-1.24396952e-07 -4.61627902e-03  0.00000000e+00  6.41057807e-03]
 [ 1.03664126e-07  2.56459945e-03  0.00000000e+00 -3.56143225e-03]
 [-1.03664126e-07  3.07751939e-03  0.00000000e+00 -4.27371877e-03]
 [-1.24396952e-07  2.78741648e-11  0.00000000e+00 -3.93299855e-11]
 [ 6.21984758e-08 -2.56459949e-03  0.00000000e+00  3.56143230e-03]
 [ 2.07328253e-08  2.05167957e-03  0.00000000e+00 -2.84914582e-03]
 [ 8.29313011e-08  2.56459945e-03  0.00000000e+00 -3.56143226e-03]
 [ 1.65862602e-07  3.59043922e-03  0.00000000e+00 -4.98600515e-03]
 [ 0.00000000e+00  1.53875968e-03  0.00000000e+00 -2.13685937e-03]
 [-2.07328253e-08 -5.12919890e-04  0.00000000e+00  7.12286450e-04]
 [-4.14656506e-08 -4.10335915e-03  0.00000000e+00  5.69829164e-03]
 [ 8.29313011e-08 -5.12919896e-03  0.00000000e+00  7.12286459e-03]
 [-4.14656506e-08 -1.02583978e-03  0.00000000e+00  1.42457290e-03]
 [ 0.00000000e+00 -5.12919894e-04  0.00000000e+00  7.12286457e-04]
 [ 6.21984758e-08  2.05167956e-03  0.00000000e+00 -2.84914581e-03]
 [-8.29313011e-08 -2.05167956e-03  0.00000000e+00  2.84914580e-03]
 [ 4.14656506e-08 -5.12919904e-04  0.00000000e+00  7.12286470e-04]
 [-1.86595428e-07  4.10335920e-03  0.00000000e+00 -5.69829171e-03]
 [-8.29313011e-08  3.59043928e-03  0.00000000e+00 -4.98600522e-03]
 [ 2.07328253e-07 -2.56459952e-03  0.00000000e+00  3.56143235e-03]
 [ 6.21984758e-08  1.53875967e-03  0.00000000e+00 -2.13685935e-03]
 [-6.21984758e-08  3.59043927e-03  0.00000000e+00 -4.98600522e-03]
```

```
 [ 1.24396952e-07 -3.07751939e-03  0.00000000e+00  4.27371878e-03]
 [-1.65862602e-07  4.10335919e-03  0.00000000e+00 -5.69829171e-03]
 [ 8.29313011e-08 -3.59043928e-03  0.00000000e+00  4.98600522e-03]
 [ 4.14656506e-08  1.02583978e-03  0.00000000e+00 -1.42457290e-03]
 [ 1.65862602e-07  1.53875965e-03  0.00000000e+00 -2.13685932e-03]
 [-1.24396952e-07 -3.59043923e-03  0.00000000e+00  4.98600516e-03]
 [ 1.65862602e-07 -5.12919898e-03  0.00000000e+00  7.12286462e-03]
 [-6.21984758e-08 -1.53875967e-03  0.00000000e+00  2.13685935e-03]
 [ 2.07328253e-08 -4.64569413e-12  0.00000000e+00  6.55499759e-12]
 [ 1.45129777e-07  4.61627902e-03  0.00000000e+00 -6.41057807e-03]
 [-1.86595428e-07  2.05167962e-03  0.00000000e+00 -2.84914589e-03]
 [-2.07328253e-08 -5.12919894e-03  0.00000000e+00  7.12286456e-03]
 [ 1.24396952e-07 -2.78741648e-11  0.00000000e+00  3.93299855e-11]
 [ 1.45129777e-07  1.53875965e-03  0.00000000e+00 -2.13685932e-03]
 [ 1.86595428e-07 -4.18112471e-11  0.00000000e+00  5.89949783e-11]
 [ 1.86595428e-07  3.07751932e-03  0.00000000e+00 -4.27371868e-03]
 [ 1.65862602e-07  2.56459943e-03  0.00000000e+00 -3.56143223e-03]
 [ 1.65862602e-07 -1.02583983e-03  0.00000000e+00  1.42457297e-03]
 [-2.07328253e-08  2.56459948e-03  0.00000000e+00 -3.56143229e-03]
 [ 1.65862602e-07  2.56459943e-03  0.00000000e+00 -3.56143223e-03]
 [-1.65862602e-07  4.10335919e-03  0.00000000e+00 -5.69829171e-03]
 [ 2.07328253e-08  1.02583978e-03  0.00000000e+00 -1.42457291e-03]
 [-1.45129777e-07  5.12919927e-04  0.00000000e+00 -7.12286503e-04]
 [-1.24396952e-07 -4.61627902e-03  0.00000000e+00  6.41057807e-03]
 [-4.14656506e-08 -5.12919885e-04  0.00000000e+00  7.12286444e-04]]
Input is:
[[ -8   1   5   2  -7  -1  -4   3  -8   9   6  -3  -9  -3  -8   0 -10  -9
    6   4   8  -5  -4  -5  -4   8   1   5   1   6 -10   5   6  -9  -4  -6
   -6 -10   3  -1   7   9  -2   5  -2   2   1  -2   8   4  -7  -9   7  -7
    3  -2   9   3   4  -4  -4  -2   6  -3]
 [  8   6   3   3   9  -3   3   7  -4  -8  -7  -7   2   3  -1   0   2  -6
    6  -2 -10   5  -4   0  -9   5  -8   0   2   4   3  -8   3   8   8  -7
   -4   6   6   5   1   6  -1 -10  -2   0   5  -5  -3   1 -10   7   1   5
   -5 -10   9  -6  -7  -2   6  -2   8   8]
 [ -7   2  -5  -3  -6   7   1   5  -8   1  -3   1   0  -8   4   4  -3  -3
   -8  -7  -6   6  -5   3 -10  -3 -10  -2   2  -8  -4  -1  -9  -2  -3   1
    5  -9   2  -1   1   3  -6   0  -1   9   3   8  -3   3   0   4  -7   2
    2   7   4  -3  -3  -3   7   2   0   0]
 [  0   4   2   1   0   6  -4   3   6   7   6  -5   6   8   1  -4   5  -1
   -5   9  -5  -2   2   4   1   7   7   5   7   8   3  -4   2  -5   8  -8
   -1   5   5  -2  -7  -3   6  -9  -7  -5  -1   9  -7  -3   8  -9 -10   0
    3  -8  -4  -5   9   7   4   5   6  -8]
 [  8  -8  -7   2  -8   2   7  -5   2  -7  -2   9  -2   8  -3  -1  -9  -5
   -5  -8  -6  -1 -10   2  -8  -8   5   4  -4  -5   1   0  -2   4  -3   2
    2   4   8   6   0   0   5   1   4 -10   2   6  -3  -8  -4   6   5  -9
   -5  -8  -1   2  -5   7   9   6  -6   9]]
label is:
[[0. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [0. 0. 0. 0. 1. 0. 0. 0. 0. 0.]
 [0. 0. 1. 0. 0. 0. 0. 0. 0. 0.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 1. 0. 0. 0.]]
```

```
z is:
[[-1.         -1.         -1.         -1.        ]
 [ 0.9997321   1.         -0.99990473 -0.9204233 ]
 [-1.         -1.         -1.         -1.        ]
 [ 1.          1.          1.          1.        ]
 [-1.         -0.99999987 -1.         -1.        ]]
y is:
[[0.11136856 0.13585665 0.14808912 0.03447963 0.09415558 0.05230229
  0.02681618 0.0866395  0.18089233 0.12940017]
 [0.06323198 0.06861032 0.11512609 0.0620294  0.06567814 0.07601631
  0.11937471 0.09447903 0.21918535 0.11626868]
 [0.11136856 0.13585665 0.14808912 0.03447963 0.09415558 0.05230229
  0.02681618 0.0866395  0.18089233 0.12940017]
 [0.03351639 0.08785387 0.09082674 0.2022132  0.06201136 0.08410143
  0.23688468 0.07828413 0.06630972 0.05799847]
 [0.11136856 0.13585664 0.14808912 0.03447963 0.09415558 0.05230229
  0.02681618 0.0866395  0.18089233 0.12940017]]
GT is:
[[ 9.56067289e-04 -7.82808850e-07 -1.44127309e-04 -3.58698550e-03]
 [ 7.17050468e-04  7.82808291e-07 -1.08095482e-04 -2.69023912e-03]
 [ 3.58525234e-04  6.84957661e-07 -5.40477407e-05 -1.34511956e-03]
 [ 3.58525234e-04 -1.95701777e-07 -5.40477409e-05 -1.34511956e-03]
 [ 1.07557570e-03  7.82807486e-07 -1.62143222e-04 -4.03535869e-03]
 [-3.58525234e-04 -1.95702174e-07  5.40477408e-05  1.34511956e-03]
 [ 3.58525233e-04 -6.84957477e-07 -5.40477410e-05 -1.34511956e-03]
 [ 8.36558879e-04  4.89255475e-07 -1.26111395e-04 -3.13861231e-03]
 [-4.78033645e-04 -1.95702926e-07  7.20636544e-05  1.79349275e-03]
 [-9.56067289e-04  6.84957939e-07  1.44127309e-04  3.58698550e-03]
 [-8.36558879e-04  1.95702568e-07  1.26111395e-04  3.13861231e-03]
 [-8.36558879e-04 -8.80659528e-07  1.26111395e-04  3.13861231e-03]
 [ 2.39016823e-04  1.95701100e-07 -3.60318272e-05 -8.96746374e-04]
 [ 3.58525233e-04 -7.82808389e-07 -5.40477410e-05 -1.34511956e-03]
 [-1.19508411e-04  2.93552182e-07  1.80159137e-05  4.48373188e-04]
 [ 7.57458642e-14  9.78510149e-08  1.89481349e-14 -9.53033905e-13]
 [ 2.39016823e-04  8.80658090e-07 -3.60318271e-05 -8.96746374e-04]
 [-7.17050467e-04  4.89254039e-07  1.08095482e-04  2.69023913e-03]
 [ 7.17050468e-04  4.89255781e-07 -1.08095482e-04 -2.69023913e-03]
 [-2.39016822e-04  7.82808502e-07  3.60318274e-05  8.96746377e-04]
 [-1.19508411e-03  5.87106798e-07  1.80159136e-04  4.48373188e-03]
 [ 5.97542056e-04  9.78505510e-08 -9.00795680e-05 -2.24186594e-03]
 [-4.78033644e-04  9.78509660e-07  7.20636546e-05  1.79349275e-03]
 [-1.56815810e-13 -1.95702557e-07 -3.88561079e-14  9.53033905e-13]
 [-1.07557570e-03  7.82807569e-07  1.62143223e-04  4.03535869e-03]
 [ 5.97542057e-04  7.82809016e-07 -9.00795679e-05 -2.24186594e-03]
 [-9.56067290e-04 -4.89255068e-07  1.44127309e-04  3.58698550e-03]
 [-3.17624681e-13 -3.91403528e-07 -7.48327012e-14  1.19129238e-12]
 [ 2.39016823e-04  3.91404183e-07 -3.60318271e-05 -8.96746374e-04]
 [ 4.78033645e-04  4.89255751e-07 -7.20636543e-05 -1.79349275e-03]
 [ 3.58525234e-04 -9.78520320e-08 -5.40477409e-05 -1.34511956e-03]
 [-9.56067290e-04  4.25615179e-13  1.44127309e-04  3.58698550e-03]
 [ 3.58525234e-04  1.95702699e-07 -5.40477408e-05 -1.34511956e-03]
 [ 9.56067290e-04 -3.91404899e-07 -1.44127309e-04 -3.58698550e-03]
```

```
 [ 9.56067290e-04  2.93552719e-07 -1.44127309e-04 -3.58698550e-03]
 [-8.36558879e-04 -1.95702749e-07  1.26111395e-04  3.13861231e-03]
 [-4.78033645e-04 -1.95702713e-07  7.20636544e-05  1.79349275e-03]
 [ 7.17050467e-04 -3.91405034e-07 -1.08095482e-04 -2.69023912e-03]
 [ 7.17050467e-04 -7.82807715e-07 -1.08095482e-04 -2.69023912e-03]
 [ 5.97542056e-04 -5.87106121e-07 -9.00795682e-05 -2.24186594e-03]
 [ 1.19508411e-04  7.54861312e-13 -1.80159136e-05 -4.48373189e-04]
 [ 7.17050467e-04  1.02972274e-12 -1.08095482e-04 -2.69023913e-03]
 [-1.19508412e-04 -4.89255294e-07  1.80159135e-05  4.48373189e-04]
 [-1.19508411e-03 -9.78506122e-08  1.80159136e-04  4.48373187e-03]
 [-2.39016823e-04 -3.91404289e-07  3.60318271e-05  8.96746374e-04]
 [ 8.04044356e-13  9.78510348e-07  1.89865284e-13 -1.19129238e-12]
 [ 5.97542056e-04 -1.95701856e-07 -9.00795681e-05 -2.24186594e-03]
 [-5.97542057e-04 -5.87106361e-07  9.00795679e-05  2.24186594e-03]
 [-3.58525233e-04  2.93553849e-07  5.40477409e-05  1.34511956e-03]
 [ 1.19508412e-04  7.82808545e-07 -1.80159135e-05 -4.48373188e-04]
 [-1.19508411e-03  3.91403182e-07  1.80159136e-04  4.48373188e-03]
 [ 8.36558878e-04 -5.87106938e-07 -1.26111395e-04 -3.13861232e-03]
 [ 1.19508411e-04 -4.89254312e-07 -1.80159137e-05 -4.48373190e-04]
 [ 5.97542057e-04  8.80658447e-07 -9.00795679e-05 -2.24186594e-03]
 [-5.97542056e-04  4.89255319e-07  9.00795681e-05  2.24186594e-03]
 [-1.19508411e-03  7.82807770e-07  1.80159136e-04  4.48373187e-03]
 [ 1.07557570e-03  9.78520826e-08 -1.62143222e-04 -4.03535869e-03]
 [-7.17050468e-04 -1.95701786e-07  1.08095482e-04  2.69023912e-03]
 [-8.36558878e-04  4.89255396e-07  1.26111395e-04  3.13861232e-03]
 [-2.39016823e-04 -6.84957546e-07  3.60318271e-05  8.96746377e-04]
 [ 7.17050467e-04 -8.80659468e-07 -1.08095482e-04 -2.69023912e-03]
 [-2.39016823e-04 -5.87106320e-07  3.60318271e-05  8.96746376e-04]
 [ 9.56067290e-04  5.87106817e-07 -1.44127309e-04 -3.58698550e-03]
 [ 9.56067289e-04 -8.80659332e-07 -1.44127309e-04 -3.58698550e-03]]
Your answer is:
[[ 9.56067289e-04 -7.82808850e-07 -1.44127309e-04 -3.58698550e-03]
 [ 7.17050468e-04  7.82808291e-07 -1.08095482e-04 -2.69023912e-03]
 [ 3.58525234e-04  6.84957661e-07 -5.40477407e-05 -1.34511956e-03]
 [ 3.58525234e-04 -1.95701777e-07 -5.40477409e-05 -1.34511956e-03]
 [ 1.07557570e-03  7.82807486e-07 -1.62143222e-04 -4.03535869e-03]
 [-3.58525234e-04 -1.95702174e-07  5.40477408e-05  1.34511956e-03]
 [ 3.58525233e-04 -6.84957477e-07 -5.40477410e-05 -1.34511956e-03]
 [ 8.36558879e-04  4.89255475e-07 -1.26111395e-04 -3.13861231e-03]
 [-4.78033645e-04 -1.95702926e-07  7.20636544e-05  1.79349275e-03]
 [-9.56067289e-04  6.84957939e-07  1.44127309e-04  3.58698550e-03]
 [-8.36558879e-04  1.95702568e-07  1.26111395e-04  3.13861231e-03]
 [-8.36558879e-04 -8.80659528e-07  1.26111395e-04  3.13861231e-03]
 [ 2.39016823e-04  1.95701100e-07 -3.60318272e-05 -8.96746374e-04]
 [ 3.58525233e-04 -7.82808389e-07 -5.40477410e-05 -1.34511956e-03]
 [-1.19508411e-04  2.93552182e-07  1.80159137e-05  4.48373188e-04]
 [ 7.57458642e-14  9.78510149e-08  1.89481349e-14 -9.53033905e-13]
 [ 2.39016823e-04  8.80658090e-07 -3.60318271e-05 -8.96746374e-04]
 [-7.17050467e-04  4.89254039e-07  1.08095482e-04  2.69023913e-03]
 [ 7.17050468e-04  4.89255781e-07 -1.08095482e-04 -2.69023913e-03]
 [-2.39016822e-04  7.82808502e-07  3.60318274e-05  8.96746377e-04]
 [-1.19508411e-03  5.87106798e-07  1.80159136e-04  4.48373188e-03]
```

```
 [ 5.97542056e-04  9.78505510e-08 -9.00795680e-05 -2.24186594e-03]
 [-4.78033644e-04  9.78509660e-07  7.20636546e-05  1.79349275e-03]
 [-1.56815810e-13 -1.95702557e-07 -3.88561079e-14  9.53033905e-13]
 [-1.07557570e-03  7.82807569e-07  1.62143223e-04  4.03535869e-03]
 [ 5.97542057e-04  7.82809016e-07 -9.00795679e-05 -2.24186594e-03]
 [-9.56067290e-04 -4.89255068e-07  1.44127309e-04  3.58698550e-03]
 [-3.17624681e-13 -3.91403528e-07 -7.48327012e-14  1.19129238e-12]
 [ 2.39016823e-04  3.91404183e-07 -3.60318271e-05 -8.96746374e-04]
 [ 4.78033645e-04  4.89255751e-07 -7.20636543e-05 -1.79349275e-03]
 [ 3.58525234e-04 -9.78520320e-08 -5.40477409e-05 -1.34511956e-03]
 [-9.56067290e-04  4.25615179e-13  1.44127309e-04  3.58698550e-03]
 [ 3.58525234e-04  1.95702699e-07 -5.40477408e-05 -1.34511956e-03]
 [ 9.56067290e-04 -3.91404899e-07 -1.44127309e-04 -3.58698550e-03]
 [ 9.56067290e-04  2.93552719e-07 -1.44127309e-04 -3.58698550e-03]
 [-8.36558879e-04 -1.95702749e-07  1.26111395e-04  3.13861231e-03]
 [-4.78033645e-04 -1.95702713e-07  7.20636544e-05  1.79349275e-03]
 [ 7.17050467e-04 -3.91405034e-07 -1.08095482e-04 -2.69023912e-03]
 [ 7.17050467e-04 -7.82807715e-07 -1.08095482e-04 -2.69023912e-03]
 [ 5.97542056e-04 -5.87106121e-07 -9.00795682e-05 -2.24186594e-03]
 [ 1.19508411e-04  7.54861312e-13 -1.80159136e-05 -4.48373189e-04]
 [ 7.17050467e-04  1.02972274e-12 -1.08095482e-04 -2.69023913e-03]
 [-1.19508412e-04 -4.89255294e-07  1.80159135e-05  4.48373189e-04]
 [-1.19508411e-03 -9.78506122e-08  1.80159136e-04  4.48373187e-03]
 [-2.39016823e-04 -3.91404289e-07  3.60318271e-05  8.96746374e-04]
 [ 8.04044356e-13  9.78510348e-07  1.89865284e-13 -1.19129238e-12]
 [ 5.97542056e-04 -1.95701856e-07 -9.00795681e-05 -2.24186594e-03]
 [-5.97542057e-04 -5.87106361e-07  9.00795679e-05  2.24186594e-03]
 [-3.58525233e-04  2.93553849e-07  5.40477409e-05  1.34511956e-03]
 [ 1.19508412e-04  7.82808545e-07 -1.80159135e-05 -4.48373188e-04]
 [-1.19508411e-03  3.91403182e-07  1.80159136e-04  4.48373188e-03]
 [ 8.36558878e-04 -5.87106938e-07 -1.26111395e-04 -3.13861232e-03]
 [ 1.19508411e-04 -4.89254312e-07 -1.80159137e-05 -4.48373190e-04]
 [ 5.97542057e-04  8.80658447e-07 -9.00795679e-05 -2.24186594e-03]
 [-5.97542056e-04  4.89255319e-07  9.00795681e-05  2.24186594e-03]
 [-1.19508411e-03  7.82807770e-07  1.80159136e-04  4.48373187e-03]
 [ 1.07557570e-03  9.78520826e-08 -1.62143222e-04 -4.03535869e-03]
 [-7.17050468e-04 -1.95701786e-07  1.08095482e-04  2.69023912e-03]
 [-8.36558878e-04  4.89255396e-07  1.26111395e-04  3.13861232e-03]
 [-2.39016823e-04 -6.84957546e-07  3.60318271e-05  8.96746377e-04]
 [ 7.17050467e-04 -8.80659468e-07 -1.08095482e-04 -2.69023912e-03]
 [-2.39016823e-04 -5.87106320e-07  3.60318271e-05  8.96746376e-04]
 [ 9.56067290e-04  5.87106817e-07 -1.44127309e-04 -3.58698550e-03]
 [ 9.56067289e-04 -8.80659332e-07 -1.44127309e-04 -3.58698550e-03]]
Input is:
[[  0   2   8  -7  -2  -7  -9   0  -3  -3  -8   8  -9  -9   4   7   1  -1
    9  -5   3   9  -9   5   0  -2  -1   2  -1   5   6  -6  -3   4   8   0
    9  -7  -8  -1   3   2   5  -1   7  -5  -1  -5  -4   7   2  -4   8   5
   -6  -4   9   1   1   7  -4  -8   5  -7]
 [ -9   0   8   7 -10  -4   1  -6   4   3  -8  -3 -10   6   1   5   1  -1
   -4  -4  -1  -6 -10   9   6   3   5   1   9  -1  -3   7   8   5   1   8
   -9  -9  -7   0  -7   6  -2   7  -1   7   4  -4  -8   8  -3   5  -2   3
    4 -10   6   6  -4  -7   4   9   6 -10]
```

```
 [  6   6  -7   9  -4   0   2   1   6  -5   2  -6   1   1   5  -1   6  -9
    9   8  -4  -4  -2   0   7  -1  -3   6  -9 -10  -1   6   0   8  -9   4
    9  -3  -2  -7   8  -4  -6  -1   6   7   7  -7  -7  -4  -3  -1  -5  -6
   -5  -4   9   1 -10   4  -7   8  -2  -1]
 [  1 -10   9  -7   0  -6  -5 -10   1  -3   5  -5  -4  -8   6  -5   3   1
    7  -8   9  -4  -7 -10  -4   3  -4   1  -3   0 -10  -1 -10  -4   1  -5
   -6   9  -6  -4   3   5   1  -8  -1  -2   7   2   3  -4   5  -2   4  -6
   -1  -2   2  -5  -1   7   3  -5  -4   3]
 [  9   9  -6   7   3  -1   3  -1   2  -2   4   5   0   1  -5   4  -1 -10
   -4   5   6  -8  -1  -5   0   6   6  -1  -6  -7  -7   0  -3  -2   7   0
   -8   1   3   5   3  -8  -6   6  -4   8   9  -7   8   8  -2  -2   9  -3
   -3   3  -3   4  -3  -9   7   9   9   8]]
label is:
[[1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 1. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 1. 0.]
 [0. 0. 0. 1. 0. 0. 0. 0. 0. 0.]
 [0. 1. 0. 0. 0. 0. 0. 0. 0. 0.]]
z is:
[[-1.         1.        -1.         1.       ]
 [-0.98534019  0.58873737  1.        -1.       ]
 [ 0.94705639  1.        -1.        -1.       ]
 [-1.        -1.        -1.        -1.       ]
 [ 1.         1.         1.         1.       ]]
y is:
[[0.01640088 0.07236455 0.24074259 0.08270278 0.13978962 0.13017676
  0.04130982 0.14189951 0.08117491 0.05343859]
 [0.134575   0.05358642 0.07763386 0.05904412 0.14217245 0.04869702
  0.17442353 0.15901062 0.06435189 0.08650511]
 [0.08867181 0.08483062 0.07938455 0.14003061 0.16143767 0.14106937
  0.14421193 0.06752621 0.04978868 0.04304856]
 [0.10794673 0.19106718 0.08542856 0.05016058 0.24217004 0.03841447
  0.07902118 0.07175926 0.08602746 0.04800454]
 [0.06536085 0.03461795 0.06955702 0.0801178  0.073204   0.17152556
  0.06300083 0.15211685 0.06207756 0.22842159]]
GT is:
[[ 1.02721795e-01  1.47074791e+00  2.87621016e-10  0.00000000e+00]
 [ 9.46385632e-02  1.00128377e-09  5.65019192e-11  2.92234027e-13]
 [-1.17596752e-01 -1.30733147e+00 -2.42493681e-10  1.16893611e-12]
 [ 1.35670886e-01 -1.14391505e+00 -1.36699472e-10 -1.02281910e-12]
 [-5.41110063e-02  1.63416435e+00  2.76859894e-10 -2.92234027e-13]
 [ 3.59254767e-03  6.53665735e-01  9.63052826e-11 -1.02281910e-12]
 [ 3.06480508e-02 -1.63416439e-01 -6.84592655e-12 -1.31505312e-12]
 [ 2.11619154e-02  9.80498608e-01  1.47460594e-10  0.00000000e+00]
 [ 9.10460156e-02 -6.53665740e-01 -9.11178909e-11 -4.38351041e-13]
 [-8.15598801e-02 -4.90249306e-01 -8.88458939e-11 -4.38351041e-13]
 [ 3.87312831e-02  1.30733147e+00  2.30687486e-10 -1.16893611e-12]
 [-9.19441525e-02  4.90249308e-01  1.10338203e-10  1.16893611e-12]
 [ 2.47544630e-02  1.63416434e+00  2.56594509e-10 -1.31505312e-12]
 [ 1.03842724e-02 -9.80498613e-01 -1.47869569e-10 -1.31505312e-12]
 [ 7.79673324e-02 -1.63416433e-01 -5.87739163e-11  5.84468054e-13]
 [-2.02637785e-02 -8.17082170e-01 -1.02537747e-10  1.02281910e-12]
```

```
 [ 9.37404263e-02 -1.63416434e-01 -3.33211399e-11  1.46117014e-13]
 [-1.41059708e-01  1.63416434e-01 -3.66228734e-11 -1.46117014e-13]
 [ 1.45550393e-01  6.53665743e-01  7.52219483e-11  1.31505312e-12]
 [ 1.29777299e-01  6.53665736e-01  1.33155279e-10 -7.30585068e-13]
 [-6.21942386e-02  1.63416436e-01  6.49837449e-11  4.38351041e-13]
 [-5.77035540e-02  9.80498613e-01  1.03582820e-10  1.31505312e-12]
 [-2.25648186e-02  1.63416434e+00  2.50793655e-10 -1.31505312e-12]
 [-8.08323225e-03 -1.47074791e+00 -2.63190676e-10  7.30585068e-13]
 [ 1.05022836e-01 -9.80498608e-01 -1.55510810e-10  0.00000000e+00]
 [-1.84675046e-02 -4.90249305e-01 -3.83493158e-11 -2.92234027e-13]
 [-5.18099662e-02 -8.17082174e-01 -8.93001403e-11 -1.46117014e-13]
 [ 9.37404263e-02 -1.63416434e-01 -3.33211399e-11  2.92234027e-13]
 [-1.50041077e-01 -1.47074791e+00 -2.67764606e-10 -1.46117014e-13]
 [-1.56832802e-01  1.63416437e-01 -1.71754382e-11  7.30585068e-13]
 [-1.30786831e-02  4.90249307e-01  3.23439746e-11  8.76702082e-13]
 [ 8.83516048e-02 -1.14391505e+00 -1.80986222e-10 -8.76702082e-13]
 [-7.18509534e-03 -1.30733148e+00 -2.24682145e-10 -4.38351041e-13]
 [ 1.21694066e-01 -8.17082171e-01 -1.42864029e-10  5.84468054e-13]
 [-1.42855982e-01 -1.63416431e-01  2.10606985e-11  1.16893611e-12]
 [ 5.59072801e-02 -1.30733148e+00 -2.06257147e-10  0.00000000e+00]
 [ 1.50041077e-01  1.47074792e+00  1.77964183e-10  1.31505312e-12]
 [-3.92360494e-02  1.47074791e+00  2.38146875e-10 -1.02281910e-12]
 [-2.52592293e-02  1.14391504e+00  1.99411220e-10 -1.16893611e-12]
 [-1.10411657e-01 -5.00724340e-10  3.35029914e-11 -1.46117014e-13]
 [ 1.32471709e-01  1.14391504e+00  1.97366346e-10  4.38351041e-13]
 [-6.84811970e-02 -9.80498607e-01 -2.04575976e-10  2.92234027e-13]
 [-9.28422894e-02  3.26832872e-01  1.41008279e-11  7.30585068e-13]
 [-2.20600523e-02 -1.14391504e+00 -1.41068914e-10 -1.46117014e-13]
 [ 9.55367001e-02  1.63416438e-01 -1.20428846e-12  1.02281910e-12]
 [ 1.04124699e-01 -1.14391505e+00 -1.29876182e-10 -7.30585068e-13]
 [ 1.06819109e-01 -6.53665739e-01 -4.64221667e-11 -1.46117014e-13]
 [-1.06819109e-01  6.53665736e-01  5.92507986e-11 -7.30585068e-13]
 [-1.03226562e-01  1.30733148e+00  2.58185136e-10 -5.84468054e-13]
 [-7.02774708e-02 -1.30733147e+00 -1.53306720e-10  1.02281910e-12]
 [-4.46248709e-02  4.90249305e-01  6.48245292e-11  2.92234027e-13]
 [-2.02637785e-02 -8.17082175e-01 -1.41023643e-10 -5.84468054e-13]
 [-7.70691955e-02  3.26832873e-01  1.10111080e-10  1.16893611e-12]
 [-9.73329740e-02 -4.90249302e-01 -9.50557225e-11  7.30585068e-13]
 [-8.24580170e-02 -6.53665742e-01 -1.20940109e-10 -8.76702082e-13]
 [-5.41110063e-02  1.63416434e+00  2.76859894e-10 -5.84468054e-13]
 [ 1.36569023e-01 -9.80498604e-01 -1.75162732e-10  1.31505312e-12]
 [ 1.03842724e-02 -9.80498608e-01 -1.28626621e-10  1.46117014e-13]
 [-1.54138391e-01  6.53665739e-01  8.55215245e-11  1.46117014e-13]
 [ 6.93793339e-02  1.14391505e+00  1.21212504e-10  1.02281910e-12]
 [-1.14004205e-01 -6.53665741e-01 -5.63879752e-11 -5.84468054e-13]
 [ 1.18101519e-01 -1.47074792e+00 -1.75026152e-10 -1.16893611e-12]
 [-3.69350092e-02 -9.80498606e-01 -9.59415795e-11  7.30585068e-13]
 [-6.79172470e-03  1.63416434e+00  3.08318011e-10 -1.02281910e-12]]
Your answer is:
[[ 1.02721795e-01  1.47074791e+00  2.87621016e-10  0.00000000e+00]
 [ 9.46385632e-02  1.00128377e-09  5.65019192e-11  2.92234027e-13]
 [-1.17596752e-01 -1.30733147e+00 -2.42493681e-10  1.16893611e-12]
```

[1.35670886e-01 -1.14391505e+00 -1.36699472e-10 -1.02281910e-12]
[-5.41110063e-02 1.63416435e+00 2.76859894e-10 -2.92234027e-13]
[3.59254767e-03 6.53665735e-01 9.63052826e-11 -1.02281910e-12]
[3.06480508e-02 -1.63416439e-01 -6.84592655e-12 -1.31505312e-12]
[2.11619154e-02 9.80498608e-01 1.47460594e-10 0.00000000e+00]
[9.10460156e-02 -6.53665740e-01 -9.11178909e-11 -4.38351041e-13]
[-8.15598801e-02 -4.90249306e-01 -8.88458939e-11 -4.38351041e-13]
[3.87312831e-02 1.30733147e+00 2.30687486e-10 -1.16893611e-12]
[-9.19441525e-02 4.90249308e-01 1.10338203e-10 1.16893611e-12]
[2.47544630e-02 1.63416434e+00 2.56594509e-10 -1.31505312e-12]
[1.03842724e-02 -9.80498613e-01 -1.47869569e-10 -1.31505312e-12]
[7.79673324e-02 -1.63416433e-01 -5.87739163e-11 5.84468054e-13]
[-2.02637785e-02 -8.17082170e-01 -1.02537747e-10 1.02281910e-12]
[9.37404263e-02 -1.63416434e-01 -3.33211399e-11 1.46117014e-13]
[-1.41059708e-01 1.63416434e-01 -3.66228734e-11 -1.46117014e-13]
[1.45550393e-01 6.53665743e-01 7.52219483e-11 1.31505312e-12]
[1.29777299e-01 6.53665736e-01 1.33155279e-10 -7.30585068e-13]
[-6.21942386e-02 1.63416436e-01 6.49837449e-11 4.38351041e-13]
[-5.77035540e-02 9.80498613e-01 1.03582820e-10 1.31505312e-12]
[-2.25648186e-02 1.63416434e+00 2.50793655e-10 -1.31505312e-12]
[-8.08323225e-03 -1.47074791e+00 -2.63190676e-10 7.30585068e-13]
[1.05022836e-01 -9.80498608e-01 -1.55510810e-10 0.00000000e+00]
[-1.84675046e-02 -4.90249305e-01 -3.83493158e-11 -2.92234027e-13]
[-5.18099662e-02 -8.17082174e-01 -8.93001403e-11 -1.46117014e-13]
[9.37404263e-02 -1.63416434e-01 -3.33211399e-11 2.92234027e-13]
[-1.50041077e-01 -1.47074791e+00 -2.67764606e-10 -1.46117014e-13]
[-1.56832802e-01 1.63416437e-01 -1.71754382e-11 7.30585068e-13]
[-1.30786831e-02 4.90249307e-01 3.23439746e-11 8.76702082e-13]
[8.83516048e-02 -1.14391505e+00 -1.80986222e-10 -8.76702082e-13]
[-7.18509534e-03 -1.30733148e+00 -2.24682145e-10 -4.38351041e-13]
[1.21694066e-01 -8.17082171e-01 -1.42864029e-10 5.84468054e-13]
[-1.42855982e-01 -1.63416431e-01 2.10606985e-11 1.16893611e-12]
[5.59072801e-02 -1.30733148e+00 -2.06257147e-10 0.00000000e+00]
[1.50041077e-01 1.47074792e+00 1.77964183e-10 1.31505312e-12]
[-3.92360494e-02 1.47074791e+00 2.38146875e-10 -1.02281910e-12]
[-2.52592293e-02 1.14391504e+00 1.99411220e-10 -1.16893611e-12]
[-1.10411657e-01 -5.00724340e-10 3.35029914e-11 -1.46117014e-13]
[1.32471709e-01 1.14391504e+00 1.97366346e-10 4.38351041e-13]
[-6.84811970e-02 -9.80498607e-01 -2.04575976e-10 2.92234027e-13]
[-9.28422894e-02 3.26832872e-01 1.41008279e-11 7.30585068e-13]
[-2.20600523e-02 -1.14391504e+00 -1.41068914e-10 -1.46117014e-13]
[9.55367001e-02 1.63416438e-01 -1.20428846e-12 1.02281910e-12]
[1.04124699e-01 -1.14391505e+00 -1.29876182e-10 -7.30585068e-13]
[1.06819109e-01 -6.53665739e-01 -4.64221667e-11 -1.46117014e-13]
[-1.06819109e-01 6.53665736e-01 5.92507986e-11 -7.30585068e-13]
[-1.03226562e-01 1.30733148e+00 2.58185136e-10 -5.84468054e-13]
[-7.02774708e-02 -1.30733147e+00 -1.53306720e-10 1.02281910e-12]
[-4.46248709e-02 4.90249305e-01 6.48245292e-11 2.92234027e-13]
[-2.02637785e-02 -8.17082175e-01 -1.41023643e-10 -5.84468054e-13]
[-7.70691955e-02 3.26832873e-01 1.10111080e-10 1.16893611e-12]
[-9.73329740e-02 -4.90249302e-01 -9.50557225e-11 7.30585068e-13]
[-8.24580170e-02 -6.53665742e-01 -1.20940109e-10 -8.76702082e-13]

```
 [-5.41110063e-02  1.63416434e+00  2.76859894e-10 -5.84468054e-13]
 [ 1.36569023e-01 -9.80498604e-01 -1.75162732e-10  1.31505312e-12]
 [ 1.03842724e-02 -9.80498608e-01 -1.28626621e-10  1.46117014e-13]
 [-1.54138391e-01  6.53665739e-01  8.55215245e-11  1.46117014e-13]
 [ 6.93793339e-02  1.14391505e+00  1.21212504e-10  1.02281910e-12]
 [-1.14004205e-01 -6.53665741e-01 -5.63879752e-11 -5.84468054e-13]
 [ 1.18101519e-01 -1.47074792e+00 -1.75026152e-10 -1.16893611e-12]
 [-3.69350092e-02 -9.80498606e-01 -9.59415795e-11  7.30585068e-13]
 [-6.79172470e-03  1.63416434e+00  3.08318011e-10 -1.02281910e-12]]
Input is:
[[ 2  4 -5  2 -4 -7  4 -8  5  2 -4 -2 -7 -5 -4 -1 -10  8
  -3  4 -8  0 -10  9 -8  6  2  9  4 -8  9 -1 -9  4  9 -5
  -7 -3 -4  2 -9  2  0  7 -4  1  3 -6 -9  2  8 -2 -1  3
   7  0 -9 -4  4  4  8  3  2  5]
 [ 9  0  2 -1  0 -8 -6 -1  7 -2 -8 -7 -1  3 -7 -7 -5 -2
  -4  8  1  0  3  6  3 -4 -2 -1 -4 -9 -9 -2 -5 -2 -8 -10
  -6 -9 -6  2  9  8 -1  5  2  5 -8 -10 -7  0 -10 -8 -5  7
  -1  3 -3 -3 -1 -10  0  7  0  1]
 [ 5  2  7 -10 -9  9 -7  3  8 -7  6  5 -8 -1 -10 -7  0  1
  -6  9  4  6 -8  1  2 -2  6  9 -8  9  5 -10  0 -1 -2  2
  -4 -4 -3 -6 -1  5 -7  6  3 -2  8  9  0 -1 -3  4 -1 -7
   5  7 -3  9  5  0 -2 -5  4  1]
 [ 5 -2  5  3  9 -7  5 -4 -4 -9  0 -10  6 -4  1  2  4 -6
   0  3 -10  3  6 -8 -8 -1 -9  8  4  4  4  5  0 -10  5  5
   6 -1 -9  8  5 -10  5  7  2 -6 -10 -2 -3  9  5 -9  7 -4
  -3  8  2 -5 -7  8  7  0 -3 -1]
 [ -2 -2  9 -10 -3  4  5  6  4  2 -7  9 -10  3 -3 -6  1  2
  -1  1  0  8 -3  6 -9  1  8  3  6  8  5  2 -9  8 -1  3
   5  4  3  2 -3  9  3 -5 -1  6  7  0  0  9 -6 -6  9  9
  -5  8 -5  0  9  1  9  9 -6  5]]
label is:
[[0. 0. 0. 0. 1. 0. 0. 0. 0. 0.]
 [0. 0. 0. 1. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 1. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [0. 0. 0. 0. 0. 0. 0. 0. 1. 0.]]
z is:
[[-0.99999992 -0.99991499 -1.         -1.        ]
 [-1.         -1.         -1.         -1.        ]
 [ 0.03939551  1.          0.99977889  0.99998786]
 [ 0.99999995  1.          1.          0.99999999]
 [ 1.          1.          1.          1.        ]]
y is:
[[0.11840969 0.1325465  0.12481613 0.01898729 0.06907233 0.1860918
  0.08862933 0.05308334 0.0248445  0.18351908]
 [0.11840958 0.13254107 0.12481471 0.01898693 0.06907013 0.18609208
  0.08863152 0.05308528 0.02484347 0.18352522]
 [0.04125516 0.19035408 0.12707965 0.09325439 0.22928176 0.04231805
  0.06200323 0.04599839 0.12723001 0.04122528]
 [0.05367163 0.12683307 0.14277979 0.15411648 0.21614755 0.03552494
  0.05403158 0.07481989 0.10473203 0.03734305]
 [0.05367163 0.12683307 0.14277979 0.15411648 0.21614755 0.03552494
```

0.05403157 0.07481989 0.10473203 0.03734305]]
GT is:
[[7.99747028e-01 -1.27514050e-04 9.29248641e-05 -5.16544289e-05]
 [3.19898765e-01 -2.55026923e-04 3.71699456e-05 -2.06590648e-05]
 [1.11964579e+00 3.18782257e-04 1.30094810e-04 -7.23176971e-05]
 [-1.59949386e+00 -1.27511844e-04 -1.85849728e-04 1.03305033e-04]
 [-1.43954441e+00 2.55027952e-04 -1.67264755e-04 9.29700364e-05]
 [1.43954441e+00 4.46295277e-04 1.67264755e-04 -9.29742398e-05]
 [-1.11964566e+00 -2.55025599e-04 -1.30094810e-04 7.23130526e-05]
 [4.79848099e-01 5.10052817e-04 5.57549185e-05 -3.09924078e-05]
 [1.27959509e+00 -3.18784463e-04 1.48679783e-04 -8.26413310e-05]
 [-1.11964585e+00 -1.27512285e-04 -1.30094810e-04 7.23185241e-05]
 [9.59696336e-01 2.55025746e-04 1.11509837e-04 -6.19846503e-05]
 [7.99746814e-01 1.27512579e-04 9.29248641e-05 -5.16491297e-05]
 [-1.27959506e+00 4.46297777e-04 -1.48679783e-04 8.26398563e-05]
 [-1.59949458e-01 3.18783433e-04 -1.85849728e-05 1.03307935e-05]
 [-1.59949391e+00 2.55028099e-04 -1.85849728e-04 1.03304082e-04]
 [-1.11964571e+00 6.37576867e-05 -1.30094810e-04 7.23128391e-05]
 [2.98870694e-08 6.37566572e-04 7.27767206e-15 -4.76841862e-09]
 [1.59949329e-01 -5.10053405e-04 1.85849728e-05 -1.03255426e-05]
 [-9.59696353e-01 1.91270854e-04 -1.11509837e-04 6.19825280e-05]
 [1.43954457e+00 -2.55027952e-04 1.67264755e-04 -9.29752460e-05]
 [6.39797408e-01 5.10052669e-04 7.43398913e-05 -4.13203759e-05]
 [9.59696387e-01 -8.82342577e-10 1.11509837e-04 -6.19847400e-05]
 [-1.27959507e+00 6.37567749e-04 -1.48679783e-04 8.26389468e-05]
 [1.59949304e-01 -5.73810062e-04 1.85849728e-05 -1.03243712e-05]
 [3.19898654e-01 5.10052964e-04 3.71699456e-05 -2.06600983e-05]
 [-3.19898781e-01 -3.82539649e-04 -3.71699456e-05 2.06633991e-05]
 [9.59696228e-01 -1.27514197e-04 1.11509837e-04 -6.19789240e-05]
 [1.43954465e+00 -5.73811238e-04 1.67264755e-04 -9.29759007e-05]
 [-1.27959506e+00 -2.55025452e-04 -1.48679783e-04 8.26440597e-05]
 [1.43954455e+00 5.10051934e-04 1.67264755e-04 -9.29793184e-05]
 [7.99747031e-01 -5.73810650e-04 9.29248641e-05 -5.16518725e-05]
 [-1.59949384e+00 6.37581279e-05 -1.85849728e-04 1.03303255e-04]
 [-2.20391053e-08 5.73809915e-04 2.14815635e-15 -2.72870462e-09]
 [-1.59949517e-01 -2.55026482e-04 -1.85849728e-05 1.03361270e-05]
 [-3.19898692e-01 -5.73809621e-04 -3.71699456e-05 2.06617039e-05]
 [3.19898838e-01 3.18782992e-04 3.71699456e-05 -2.06648325e-05]
 [-6.39797499e-01 4.46297189e-04 -7.43398913e-05 4.13175646e-05]
 [-6.39797585e-01 1.91270560e-04 -7.43398913e-05 4.13218163e-05]
 [-4.79848305e-01 2.55027070e-04 -5.57549185e-05 3.09944132e-05]
 [-9.59696232e-01 -1.27512432e-04 -1.11509837e-04 6.19805709e-05]
 [-1.59949345e-01 5.73810062e-04 -1.85849728e-05 1.03256736e-05]
 [7.99746824e-01 -1.27514050e-04 9.29248641e-05 -5.16479170e-05]
 [-1.11964567e+00 1.02946826e-09 -1.30094810e-04 7.23118399e-05]
 [9.59696458e-01 -4.46297483e-04 1.11509837e-04 -6.19843542e-05]
 [4.79848190e-01 2.55026188e-04 5.57549185e-05 -3.09937998e-05]
 [-3.19898861e-01 -6.37563631e-05 -3.71699456e-05 2.06640538e-05]
 [1.27959500e+00 -1.91271148e-04 1.48679783e-04 -8.26393326e-05]
 [1.43954448e+00 3.82538620e-04 1.67264755e-04 -9.29761073e-05]
 [-6.28203284e-08 5.73809915e-04 -1.51996740e-15 -1.42631117e-09]
 [-1.59949264e-01 -1.27513167e-04 -1.85849728e-05 1.03272721e-05]

```
 [-4.79848085e-01 -5.10052816e-04 -5.57549185e-05  3.09919737e-05]
 [ 6.39797437e-01  1.27512726e-04  7.43398913e-05 -4.13189909e-05]
 [-1.59949298e-01  6.37568043e-05 -1.85849728e-05  1.03272308e-05]
 [-1.11964578e+00 -1.91268942e-04 -1.30094810e-04  7.23166566e-05]
 [ 7.99746931e-01 -4.46297336e-04  9.29248641e-05 -5.16494399e-05]
 [ 1.11964585e+00 -1.02936336e-09  1.30094810e-04 -7.23174836e-05]
 [-4.79848168e-01  5.73810356e-04 -5.57549185e-05  3.09881218e-05]
 [ 1.43954444e+00  2.55025305e-04  1.67264755e-04 -9.29741985e-05]
 [ 7.99746870e-01 -2.55027364e-04  9.29248641e-05 -5.16486130e-05]
 [ 1.18545086e-07 -2.55026629e-04  8.82692719e-15 -2.26029159e-09]
 [-3.19898667e-01 -5.10052964e-04 -3.71699456e-05  2.06605325e-05]
 [-7.99746948e-01 -1.91269236e-04 -9.29248641e-05  5.16537742e-05]
 [ 6.39797528e-01 -1.27513903e-04  7.43398913e-05 -4.13203830e-05]
 [ 1.59949390e-01 -3.18783433e-04  1.85849728e-05 -1.03286229e-05]]
Your answer is:
[[ 7.99747028e-01 -1.27514050e-04  9.29248641e-05 -5.16544289e-05]
 [ 3.19898765e-01 -2.55026923e-04  3.71699456e-05 -2.06590648e-05]
 [ 1.11964579e+00  3.18782257e-04  1.30094810e-04 -7.23176971e-05]
 [-1.59949386e+00 -1.27511844e-04 -1.85849728e-04  1.03305033e-04]
 [-1.43954441e+00  2.55027952e-04 -1.67264755e-04  9.29700364e-05]
 [ 1.43954441e+00  4.46295277e-04  1.67264755e-04 -9.29742398e-05]
 [-1.11964566e+00 -2.55025599e-04 -1.30094810e-04  7.23130526e-05]
 [ 4.79848099e-01  5.10052817e-04  5.57549185e-05 -3.09924078e-05]
 [ 1.27959509e+00 -3.18784463e-04  1.48679783e-04 -8.26413310e-05]
 [-1.11964585e+00 -1.27512285e-04 -1.30094810e-04  7.23185241e-05]
 [ 9.59696336e-01  2.55025746e-04  1.11509837e-04 -6.19846503e-05]
 [ 7.99746814e-01  1.27512579e-04  9.29248641e-05 -5.16491297e-05]
 [-1.27959506e+00  4.46297777e-04 -1.48679783e-04  8.26398563e-05]
 [-1.59949458e-01  3.18783433e-04 -1.85849728e-05  1.03307935e-05]
 [-1.59949391e+00  2.55028099e-04 -1.85849728e-04  1.03304082e-04]
 [-1.11964571e+00  6.37576867e-05 -1.30094810e-04  7.23128391e-05]
 [ 2.98870694e-08  6.37566572e-04  7.27767206e-15 -4.76841862e-09]
 [ 1.59949329e-01 -5.10053405e-04  1.85849728e-05 -1.03255426e-05]
 [-9.59696353e-01  1.91270854e-04 -1.11509837e-04  6.19825280e-05]
 [ 1.43954457e+00 -2.55027952e-04  1.67264755e-04 -9.29752460e-05]
 [ 6.39797408e-01  5.10052669e-04  7.43398913e-05 -4.13203759e-05]
 [ 9.59696387e-01 -8.82342577e-10  1.11509837e-04 -6.19847400e-05]
 [-1.27959507e+00  6.37567749e-04 -1.48679783e-04  8.26389468e-05]
 [ 1.59949304e-01 -5.73810062e-04  1.85849728e-05 -1.03243712e-05]
 [ 3.19898654e-01  5.10052964e-04  3.71699456e-05 -2.06600983e-05]
 [-3.19898781e-01 -3.82539649e-04 -3.71699456e-05  2.06633991e-05]
 [ 9.59696228e-01 -1.27514197e-04  1.11509837e-04 -6.19789240e-05]
 [ 1.43954465e+00 -5.73811238e-04  1.67264755e-04 -9.29759007e-05]
 [-1.27959506e+00 -2.55025452e-04 -1.48679783e-04  8.26440597e-05]
 [ 1.43954455e+00  5.10051934e-04  1.67264755e-04 -9.29793184e-05]
 [ 7.99747031e-01 -5.73810650e-04  9.29248641e-05 -5.16518725e-05]
 [-1.59949384e+00  6.37581279e-05 -1.85849728e-04  1.03303255e-04]
 [-2.20391053e-08  5.73809915e-04  2.14815635e-15 -2.72870462e-09]
 [-1.59949517e-01 -2.55026482e-04 -1.85849728e-05  1.03361270e-05]
 [-3.19898692e-01 -5.73809621e-04 -3.71699456e-05  2.06617039e-05]
 [ 3.19898838e-01  3.18782992e-04  3.71699456e-05 -2.06648325e-05]
 [-6.39797499e-01  4.46297189e-04 -7.43398913e-05  4.13175646e-05]
```

```
[-6.39797585e-01  1.91270560e-04 -7.43398913e-05  4.13218163e-05]
[-4.79848305e-01  2.55027070e-04 -5.57549185e-05  3.09944132e-05]
[-9.59696232e-01 -1.27512432e-04 -1.11509837e-04  6.19805709e-05]
[-1.59949345e-01  5.73810062e-04 -1.85849728e-05  1.03256736e-05]
[ 7.99746824e-01 -1.27514050e-04  9.29248641e-05 -5.16479170e-05]
[-1.11964567e+00  1.02946826e-09 -1.30094810e-04  7.23118399e-05]
[ 9.59696458e-01 -4.46297483e-04  1.11509837e-04 -6.19843542e-05]
[ 4.79848190e-01  2.55026188e-04  5.57549185e-05 -3.09937998e-05]
[-3.19898861e-01 -6.37563631e-05 -3.71699456e-05  2.06640538e-05]
[ 1.27959500e+00 -1.91271148e-04  1.48679783e-04 -8.26393326e-05]
[ 1.43954448e+00  3.82538620e-04  1.67264755e-04 -9.29761073e-05]
[-6.28203284e-08  5.73809915e-04 -1.51996740e-15 -1.42631117e-09]
[-1.59949264e-01 -1.27513167e-04 -1.85849728e-05  1.03272721e-05]
[-4.79848085e-01 -5.10052816e-04 -5.57549185e-05  3.09919737e-05]
[ 6.39797437e-01  1.27512726e-04  7.43398913e-05 -4.13189909e-05]
[-1.59949298e-01  6.37568043e-05 -1.85849728e-05  1.03272308e-05]
[-1.11964578e+00 -1.91268942e-04 -1.30094810e-04  7.23166566e-05]
[ 7.99746931e-01 -4.46297336e-04  9.29248641e-05 -5.16494399e-05]
[ 1.11964585e+00 -1.02936336e-09  1.30094810e-04 -7.23174836e-05]
[-4.79848168e-01  5.73810356e-04 -5.57549185e-05  3.09881218e-05]
[ 1.43954444e+00  2.55025305e-04  1.67264755e-04 -9.29741985e-05]
[ 7.99746870e-01 -2.55027364e-04  9.29248641e-05 -5.16486130e-05]
[ 1.18545086e-07 -2.55026629e-04  8.82692719e-15 -2.26029159e-09]
[-3.19898667e-01 -5.10052964e-04 -3.71699456e-05  2.06605325e-05]
[-7.99746948e-01 -1.91269236e-04 -9.29248641e-05  5.16537742e-05]
[ 6.39797528e-01 -1.27513903e-04  7.43398913e-05 -4.13203830e-05]
[ 1.59949390e-01 -3.18783433e-04  1.85849728e-05 -1.03286229e-05]]
```

test_dEdw0 (test_MLP.TestMLP) (4/4)

```
ten tests for dEdw0() with random weights and inputs
Input is:
[[ 4 -10   2  -4  -9   8  -6   3 -10   9   8   9  -7   5   1   5   0   3
   -5   8  -4   6   6  -5  -2   6   7   9   8   2  -7  -5   9  -4  -7  -3
   -2   1   2   9  -1   2   7  -8   4   2   8 -10   2   4  -1   8   5  -1
   -5   0  -1   8   7  -2  -9   4  -6 -10]
 [ -3   8   9   5  -3   3  -3  -3  -2   8  -7  -7  -9  -7  -3   2   8  -6
   -2   3   0   6   1   0  -9   0  -6   6   9   8   8  -1   2   4  -8  -4
   -3  -5   0 -10  -1   4   2 -10  -9  -1   6   6  -2   6  -5  -2   1  -2
   -4   2  -4   1  -3   0   2  -4   5  -4]
 [-10   9  -6   2  -3   6  -7  -9  -8   9  -3  -4  -5   5   5  -6   8  -4
    6  -5   8   6  -7   7  -8   0  -4   0   5  -4   9   5   1   6   5   4
   -4   0   2  -4   3   2  -1  -8  -4  -9   8   6   9 -10   2   8  -9   0
   -7   6   7  -6   6   2   8   8   4  -8]
 [  2  -7   5  -6  -7   4   8   6  -4   9   1  -1  -9  -6  -4  -9  -2   3
    0   0   3 -10   4  -8   4  -9  -3   0 -10 -10  -7   1  -9   7  -3  -3
   -8  -6  -1 -10  -6   2 -10  -5  -3   3   7   8   6   5  -1   5  -2  -8
    9   8  -5  -9  -5   6  -1   3   2   1]
 [ -9   8  -9  -6   4   8   9   2   1   3   6  -8 -10   5   8  -2   7   6
   -8  -5  -8  -8   8   6  -1  -2  -8   3   2  -4 -10   3  -9   9  -9  -7
   -1  -6  -9  -5   6 -10  -8  -6   2  -6   0   8  -9 -10  -3   3   3   1
    9   4   5  -3   5 -10   0 -10  -9  -1]]
label is:
[[1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 1. 0. 0. 0. 0. 0. 0. 0. 0.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 1. 0. 0. 0. 0. 0. 0. 0.]]
z is:
[[ 0.99999981  1.          1.          1.        ]
 [ 0.99951002 -1.         -1.         -1.        ]
 [ 1.         -1.          1.          0.99995242]
 [-1.         -1.         -1.         -1.        ]
 [-1.         -1.         -1.         -1.        ]]
y is:
[[0.0650432  0.18399159 0.06211606 0.21918019 0.06368172 0.12926827
  0.13052524 0.0213596  0.0748358  0.04999832]
 [0.18466555 0.03605645 0.18619814 0.10078533 0.12030549 0.06895503
  0.03620216 0.04806049 0.20254953 0.01622182]
 [0.13764435 0.12194111 0.07608681 0.10542381 0.06706282 0.13615508
  0.07430674 0.04631226 0.19727881 0.03778822]
 [0.13890371 0.08124921 0.10879147 0.06230952 0.08092781 0.07145873
  0.11493582 0.12219188 0.17552791 0.04370393]
 [0.13890371 0.08124921 0.10879147 0.06230952 0.08092781 0.07145873
  0.11493582 0.12219188 0.17552791 0.04370393]]
GT is:
[[-6.93999527e-05  1.80699087e-10 -6.24485709e-12 -3.22376484e-06]]
Your answer is:
[[-6.93999527e-05  1.80699087e-10 -6.24485709e-12 -3.22376484e-06]]
Input is:
[[ -9  -1   8  -7   6   0  -3  -4   3  -9  -4  -1   9   4  -6   3   1   9
   -9   2  -6   7  -4   6  -2  -8 -10   3   4  -3  -3   3   8   7  -2   1
```

```
  -4   2  -8  -5  -2  -9   4 -10 -10 -10 -10  -1  -4   1  -7  -3  -9   6
  -5   1   1  -9   7   5  -5   4  -8   8]
 [  2   7  -1   3   1  -3   1   6   5   4   8  -4   8   7  -2  -7 -10  -8
    5   0  -6  -6   0   7   9   6   2   7   7   6   4   8   1   4  -9  -1
    9   3   9  -3  -5  -4   3  -6  -8   2   0   8  -5   0   0   9   2  -7
  -10  -7   5   4  -8  -5  -8   6   0   4]
 [ -6   4  -3   5   9   4   6  -8  -7 -10  -8  -6 -10   4   8 -10  -5   8
    5   8 -10  -6 -10 -10  -1   3   0  -2   3   8  -6   8   3   3  -5   5
    7  -8  -8   4  -8   9   3  -1  -7   0  -8  -4  -5  -9   2   7   6   1
    3  -3  -7  -2  -2  -2  -7  -8  -9  -9]
 [ -3 -10  -6   1  -8   5   4  -6   4   1  -3   3 -10   2   2  -6   5  -1
   -4 -10   1 -10  -1   4  -6  -3   3   5   5   5   3   6  -7  -7  -2   8
    7  -9  -2 -10  -7  -1  -8  -1   1  -7   6   3  -8  -6  -3  -8   6   5
   -3   4   9   5  -1  -1  -4   3   4   4]
 [ -8  -2  -1  -4  -7  -4   9   8  -5   2   6   7   2  -3   7  -4   6   8
  -10   8   2   7  -7  -2  -3 -10   1  -3   3   8  -8  -5  -2  -8   2   9
   -4  -9  -1  -4   2  -3   4   6   5  -4   8  -1   0  -6  -5   4   5  -7
    5  -4 -10  -2  -5  -7   1   5   7   8]]
label is:
[[1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 1. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 1. 0. 0.]
 [0. 0. 0. 0. 0. 1. 0. 0. 0. 0.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]]
z is:
[[-1.         -1.         -1.         -1.        ]
 [ 1.          1.          1.          1.        ]
 [-1.         -1.         -1.         -1.        ]
 [-0.96692797 -1.         -1.         -1.        ]
 [ 1.          1.         -1.         -0.9973533 ]]
y is:
[[0.12797318 0.18490165 0.04261152 0.10121384 0.03104831 0.13660002
  0.09399721 0.14342118 0.04131007 0.09692302]
 [0.10320213 0.06089023 0.19468529 0.03728084 0.12714067 0.045903
  0.12049532 0.02907527 0.19328122 0.08804604]
 [0.12797318 0.18490165 0.04261152 0.10121384 0.03104831 0.13660002
  0.09399721 0.14342118 0.04131007 0.09692302]
 [0.12844614 0.18395001 0.04306573 0.10142648 0.03145783 0.1358611
  0.09512377 0.14346345 0.04179035 0.09541514]
 [0.14900445 0.12258072 0.18019368 0.04074649 0.09422215 0.10599246
  0.06038492 0.11106078 0.10715438 0.02865997]]
GT is:
[[ 1.07315784e-02  4.28370828e-16  1.01477666e-12 -4.51121464e-04]]
Your answer is:
[[ 1.07315784e-02  4.28370828e-16  1.01477666e-12 -4.51121464e-04]]
Input is:
[[ -5   9   5   2   3   3  -3   1  -5 -10 -10   3   1  -4  -6  -6  -8   3
   -3  -3   1   2   5  -7  -4   1   7   2  -9   2  -7   7   7   5   5  -8
    2  -9  -5  -7   9   5  -9   5  -5  -7   3  -8   0   8   4   3  -4   1
   -1  -3   5   6  -7   5   1   7   4  -6]
 [ -4   4  -5   3   0  -6  -8  -9  -4  -7   9   1  -7  -8   8   9   4  -5
   -5  -6   3 -10   3   7   6  -4   2   1   2  -5  -7   5  -5  -1   8  -5
```

```
   9   9   4   3   4  -6   0  -3   4   1   6   8  -2   8   1   4  -2   5
   0  -1   1   5  -6  -1  -1   4   3  -9]
 [  9   9  -6   4  -5   8  -1  -6  -9 -10   7   3  -3  -8   4   0  -4  -9
  -10   3  -5   0  -7  -7  -5   8   0  -9  -9   4   4  -4  -7  -1   4  -8
   -3  -1   7  -4   6  -7   5   6   4  -2  -2   5  -2  -1  -4   9   3   9
   -3   2 -10  -3  -1  -5  -3   4  -4   0]
 [  7  -4   2   1   6  -9   1  -1  -2  -1 -10   8  -4   6  -9   4  -5   8
   -7   1  -5  -5   6  -7   9  -7   8   0   3  -5  -8  -4   1  -7   9  -6
   -5   9   1  -5   4  -4  -7   6   8  -5  -9  -9   9   2   9   7   4  -6
   -5   6  -6   4   5   0  -4   0 -10   5]
 [  9  -3  -6   9   0  -7  -6   3  -5  -9   8   7   8   4  -4  -2   1   9
   -5  -9  -8   1  -6   6  -1  -5  -9   7   8   0   8   7   5 -10  -4   9
    0   6  -2   8  -3  -8   5  -5   8   5   4   6   3  -3   7  -9   9  -2
   -6  -6   3  -8   0   1   5   7  -2   3]]
label is:
[[1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 1. 0. 0. 0. 0.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 1. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 1. 0. 0. 0. 0. 0. 0.]]
z is:
[[-1.         -1.          0.99999986 -1.        ]
 [ 1.         -0.99998462  0.94850538 -1.        ]
 [-1.         -1.         -1.         -1.        ]
 [-1.         -0.04296965 -0.89187521 -1.        ]
 [-0.98325339  1.          0.99999223  1.        ]]
y is:
[[0.09210387 0.07399506 0.08284467 0.05668864 0.1195026  0.08636393
  0.07824108 0.17592388 0.15402659 0.08030968]
 [0.1065109  0.07597023 0.14172339 0.11961995 0.08118965 0.12145754
  0.14196826 0.07932574 0.10181264 0.0304217 ]
 [0.19817241 0.06372526 0.03072904 0.01982065 0.13144611 0.03037205
  0.13894777 0.08698261 0.2457976  0.0540065 ]
 [0.15743242 0.08521367 0.02674999 0.04270584 0.10864589 0.05793933
  0.11916331 0.08191071 0.20601176 0.11422707]
 [0.02829921 0.11182778 0.07453855 0.07882078 0.04886067 0.31634628
  0.02862202 0.07400864 0.09861795 0.1400581 ]]
GT is:
[[-1.30208906e-02 -6.75771942e-01 -1.52077898e-01  1.93541504e-13]]
Your answer is:
[[-1.30208906e-02 -6.75771942e-01 -1.52077898e-01  1.93541504e-13]]
Input is:
[[ -4  -6  -2   4  -9  -2  -4  -9  -5  -1  -6   2   1   1 -10  -1   4 -10
    6  -2   8  -1   5   1   0  -3   1   9   4  -4  -6   6   2  -1  -6  -3
   -2   4   3   2   1   5  -4  -9   6  -9 -10   9   5  -2   1   2   6  -6
   -3   2 -10   0   1   1   7  -5   1   6]
 [-10   8   8   0  -8  -5   4   2  -7  -3   9  -8   7  -9   0  -1 -10   6
    2   8  -7  -9  -4  -2   9   0  -8 -10  -7  -9  -7   7  -4  -7  -6  -3
   -9  -4  -1 -10   6  -7  -7  -8  -5  -4   6  -9  -4  -2  -1 -10  -5   0
    8  -1   5   4   8   9   5  -9   4  -6]
 [ -8  -6  -8   6   1 -10   0  -5  -1  -7   4   1   3   6  -7   8  -8   1
   -6  -1   3   5   8   3   0  -9   4 -10   8  -4   2  -1   2   3   9 -10
```

```
  -9   4   4  -4   1  -6  -1  -7   3   1 -10  -2   4  -9  -6  -1   6  -4
   1   3   4   5   8   0   0   6   3  -7]
 [  6   0  -4   6   0   5  -8   5  -1  -7   0  -3  -1  -9   5   5   5  -9
  -9   1   3  -7  -4   7   9  -7  -7 -10   7   9   2   1   9   3   0   2
  -5  -3  -3  -1   8   6   8  -9   1   0  -2  -8   1  -3   4  -6   4   7
  -9   9   0   0 -10  -6   7   9  -8  -6]
 [ -3  -9   3  -4   4   0  -3   4 -10  -9   5  -7   3  -9   6   4   6  -2
  -5   4   8   4  -1   2  -7 -10   5  -7  -9 -10  -5   6  -6   5   5   2
  -3  -3   9   7   7 -10  -3   8   7   9   6  -6  -8   3   1 -10  -3   7
   9  -9   4  -7   2  -6   5  -4  -8   9]]
label is:
[[0. 0. 0. 0. 1. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [0. 0. 0. 0. 0. 0. 0. 0. 1. 0.]
 [0. 0. 0. 0. 0. 0. 0. 1. 0. 0.]
 [0. 0. 0. 0. 1. 0. 0. 0. 0. 0.]]
z is:
[[ 0.99999991 -1.         -0.99999785 -1.        ]
 [-1.         -1.         -1.         -1.        ]
 [ 1.         -1.         -1.         -1.        ]
 [ 1.         -0.82526994 -0.99999802  1.        ]
 [-1.          1.         -1.         -1.        ]]
y is:
[[0.14256472 0.05989946 0.07086878 0.03580645 0.29335181 0.11619923
  0.06690629 0.10275317 0.06987334 0.04177675]
 [0.07848373 0.03190966 0.10157614 0.08269145 0.18702262 0.07913914
  0.16560459 0.05600183 0.13618221 0.08138864]
 [0.14256474 0.05989942 0.07086876 0.03580642 0.29335202 0.11619914
  0.06690624 0.10275313 0.06987337 0.04177676]
 [0.24717365 0.06980562 0.1461768  0.02242276 0.12726756 0.08866405
  0.03842585 0.05875161 0.09714862 0.10416348]
 [0.12841018 0.05734671 0.03447819 0.13313873 0.1685523  0.0330987
  0.12360483 0.09101182 0.12051305 0.10984549]]
GT is:
[[-2.42030992e-08 -8.35801850e-02  6.71575545e-07  1.02015037e-12]]
Your answer is:
[[-2.42030992e-08 -8.35801850e-02  6.71575545e-07  1.02015037e-12]]
Input is:
[[  3  -7   0   3   6  -1   0   3 -10   4  -4   4   0   3  -9   4   6   6
    7  -9   4   4   5   4   8   4   5   3   1   0   6   5  -5   6   3   3
   -9   3  -3  -8   6   7 -10  -1  -3  -9  -5   1   1  -3   4  -3  -6   4
    0  -4   2  -3 -10  -1  -9  -4  -6   1]
 [ -5 -10  -3  -3   8   9   2   5  -8  -5   7  -6   7  -9  -8  -3 -10  -2
   -6 -10  -5   2  -2   2   3  -1   7  -2   5 -10   0   1   6   1  -7  -7
   -3  -7   8   3   6   3  -1  -7   9  -5   8   3 -10 -10   2  -7   9   0
    9   4  -2   8  -7   5   6   1 -10   3]
 [ -4   6  -4   3   2   3  -7   3   8   5   6  -8  -3   6  -8   0  -1  -8
   -9   7  -2   5   6   9  -8   8   1  -8   6  -4   8   1   9  -6   2  -9
    4   6   2   9  -7   0  -7   4  -2  -6   0  -8   4   7  -4  -8 -10  -4
    6  -7   0   3  -2   7   9   6   2  -4]
 [ -1 -10  -6  -1  -5   2 -10   1   0   6   1  -9  -5  -9   8  -8 -10  -3
   -1   6  -7   3   3   5   3   6   7   4   3   2 -10   6   1   6  -3  -1
```

```
  -3  -9  -9  -2  -2   3   9   3  -3   3   9   1  -4  -2   9 -10   4  -6
  -5  -8   1   1  -7   7   9   2   0  -1]
 [  7   6   3   6  -4   8   8   2 -10  -2  -1  -5  -2  -1  -6  -4   9  -5
  -8   4   3  -9 -10  -2  -9   0  -2   7   7  -2   0   4   2   0 -10   1
   3   7   6  -4 -10  -8  -7  -9  -3   4  -7   9   8   0   7   2  -1   5
 -10   8   4 -10  -7   5  -7  -8   4 -10]]
label is:
[[0. 0. 0. 0. 0. 0. 1. 0. 0. 0.]
 [0. 0. 0. 1. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [0. 0. 0. 0. 0. 0. 1. 0. 0. 0.]
 [0. 0. 0. 0. 1. 0. 0. 0. 0. 0.]]
z is:
[[ 0.99986866 -0.99999851  0.9957853  -1.         ]
 [-1.         -1.         -1.         -0.99999969]
 [-0.12731279  1.          1.         -0.97403367]
 [-1.         -1.          0.99999996 -0.91171319]
 [-1.         -1.          0.4529711  -1.         ]]
y is:
[[0.04946492 0.10754179 0.1474741  0.12042535 0.04701061 0.13613243
  0.10155725 0.07728471 0.15413448 0.05897435]
 [0.03850421 0.07589965 0.06151696 0.3093448  0.0223551  0.02257458
  0.27678698 0.08164187 0.02974824 0.08162762]
 [0.09482395 0.11920892 0.07263766 0.13301727 0.05185478 0.1699619
  0.04896388 0.04698072 0.18985767 0.07269325]
 [0.07148788 0.0793614  0.09877846 0.21198138 0.0239824  0.08398928
  0.19269224 0.07803482 0.08238323 0.0773089 ]
 [0.06018872 0.07950421 0.08869542 0.24656551 0.02352365 0.05884683
  0.21562039 0.08034501 0.06435127 0.08235899]]
GT is:
[[ 2.21050268e-01  1.59499598e-06  7.97783572e-03 -5.27047014e-03]]
Your answer is:
[[ 2.21050268e-01  1.59499598e-06  7.97783572e-03 -5.27047014e-03]]
Input is:
[[  7   9  -5   8   7  -2  -2 -10   9   8  -6  -9  -6   2 -10  -4  -1  -2
   -2   8  -6   3  -6  -9   4   9   4  -8   7   5   9  -4   5   6   1  -9
   -9   8  -3   8  -4  -4   9  -1  -7   7   9  -1  -8   4  -7  -4  -9   2
    2   9   0  -7  -1   7 -10   1   5   5]
 [ -5 -10   8   8  -5  -8  -4   6   0 -10   9   2   7   7   2  -6   7  -1
   -3  -7  -2   5   4   5   5   2  -3   9  -3   8   4  -8   3  -8  -6 -10
    7   0   6   7   8  -7   2   8  -3  -2  -2 -10  -6   7   0   3   8   7
   -6   1   7  -4  -4 -10   6   9   7  -1]
 [  7   0   9   9   4  -6  -6   4  -3 -10   7  -4   0  -1   8   8  -4  -8
   -5   0  -3  -2   1  -2  -2  -6   1   4   8   8  -4  -3  -5  -7  -6   0
    4  -5   5   6  -8   8   5   3   4  -5  -3  -4   3   9   9   8   3   0
   -3   6  -7   3   6   1  -2  -6   0   7]
 [ -8  -7  -3  -8   0   1  -8   9   0 -10  -9 -10 -10   1   5   3   8  -5
    0  -6  -7  -6   3  -9   4   5  -2  -3  -9   6 -10   3  -9  -1   9   5
   -3  -3   2  -3   7   8  -1  -5   0  -2   3  -7  -8   6   3   9   3  -9
    7  -9   2   7   9  -1  -6   5   3  -3]
 [  2  -5   7   1   8  -9  -8 -10  -9   3  -4  -7   1  -3   5   0  -6  -9
    7  -5   1   1 -10   4   3   2   8  -9  -8  -9  -7   9  -3   5  -7   6
```

```
   3  -3  -8 -10  -6  -8   6   5   5   0  -9   1 -10 -10   5   3  -5  -2
  -7  -4   0 -10  -9  -7   3   4  -7   0]]
label is:
[[0. 0. 0. 0. 0. 0. 1. 0. 0. 0.]
 [0. 0. 0. 0. 1. 0. 0. 0. 0. 0.]
 [0. 0. 0. 1. 0. 0. 0. 0. 0. 0.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]]
z is:
[[ 0.9944495   0.9994195   1.         -0.91555487]
 [ 1.          1.          0.99920429  1.        ]
 [ 1.         -0.95748111  1.          1.        ]
 [-1.         -1.         -1.         -1.        ]
 [-1.         -1.         -1.         -1.        ]]
y is:
[[0.17772051 0.03063409 0.06332772 0.09069085 0.08353114 0.20608536
  0.07682373 0.16095823 0.08133503 0.02889332]
 [0.10913142 0.11530189 0.08799209 0.06771075 0.07213359 0.16470121
  0.07303623 0.11363807 0.14499623 0.05135852]
 [0.1191119  0.17303819 0.13650172 0.08100512 0.09066899 0.09285952
  0.04186254 0.09734987 0.08564028 0.08196187]
 [0.15625617 0.04288754 0.05148531 0.07972786 0.13093029 0.04995418
  0.07280968 0.10553153 0.04097009 0.26944736]
 [0.15625617 0.04288754 0.05148531 0.07972786 0.13093029 0.04995418
  0.07280968 0.10553153 0.04097009 0.26944736]]
GT is:
[[-0.00101721  0.00406598  0.00024906 -0.00463551]]
Your answer is:
[[-0.00101721  0.00406598  0.00024906 -0.00463551]]
Input is:
[[  0   6  -1   4   4   6   1   6  -5   7   2   9  -7   9   4  -4   2  -6
    0   8  -2   8  -6   1   8  -4 -10   7  -2   8   5  -4 -10   3  -8   4
    6  -6  -6   2   5   6 -10  -8  -4  -7 -10  -2  -1   8  -1   7  -8  -8
    0  -3   2   5  -9   8   3   0  -7  -2]
 [ -6  -7   2   2   4   5  -9   2  -4   6   5  -1 -10   4  -7   2   7  -8
   -6   5  -3  -6  -3   6  -1  -3   8   3   1   7   3 -10   7  -3  -2  -6
    5  -2  -5   1   7   4   4  -6   1   9  -4   6  -6  -7   2   7   9   2
    7   5   2   3   8  -1   3  -7  -1  -9]
 [ -8   4   3  -7   8 -10  -3  -7   4  -4   5  -9 -10   4   5   4   3  -9
   -7   3   9   3   5   5   6   3   8  -9   0  -8  -7   0  -8   6  -5   6
    3   4  -8   5  -8  -5   9   4  -9   8   0  -8   9  -9  -5  -8  -2 -10
   -8   6  -2   3 -10  -9   1   6   6   4]
 [ -6  -6   8  -9   5  -7   3  -1  -2   0  -8   0  -6   3  -3  -7  -2   0
   -4   2   1   3   4   9  -7   8  -2   1  -7  -9   5  -2  -4   9   4  -4
    7  -5  -4  -4   9  -6  -3  -6   2  -9  -5   5   3   5  -2  -7   2   4
  -10   6  -2  -7   1  -6  -3  -5  -8  -4]
 [ -8  -5  -3   0  -7  -1  -9   2  -3   9   4   1   2  -4  -2  -9  -1  -2
   -7   3   4   9  -2   8   9   6  -5   4  -5   8   1   3   8   5   8   5
   -1  -2  -9   5  -9  -4   9  -6  -5   7 -10   7   9  -1   3   1  -9   0
  -10   9  -1   3   2  -5   6   5   5   3]]
label is:
[[0. 0. 0. 0. 0. 1. 0. 0. 0. 0.]
```

```
 [0. 0. 0. 1. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 1. 0. 0. 0.]
 [0. 1. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 1. 0. 0. 0. 0. 0. 0. 0.]]
z is:
[[-1.         -1.          1.         -0.99999998]
 [ 1.          0.37755674  1.          0.99999619]
 [-1.         -0.99999946 -1.          0.99977315]
 [-1.         -1.         -1.         -1.        ]
 [ 1.          1.          0.9999999   1.        ]]
y is:
[[0.39293143 0.10157392 0.01435655 0.09278498 0.03381994 0.04625302
  0.04830494 0.10204868 0.09956758 0.06835896]
 [0.06109021 0.09914127 0.09431693 0.13993847 0.19793353 0.20542986
  0.12095032 0.03067472 0.02963163 0.02089306]
 [0.07688608 0.24110261 0.07977816 0.05035421 0.09134585 0.04138372
  0.14538251 0.15544616 0.03801234 0.08030836]
 [0.14064016 0.14463017 0.03159981 0.08357852 0.05290044 0.02994758
  0.1062333  0.17548197 0.0896208  0.14536725]
 [0.04687946 0.07344009 0.09026793 0.13411365 0.22564709 0.22155031
  0.12969937 0.02393651 0.03445171 0.02001388]]
GT is:
[[-1.18931755e-09  4.45830836e-02  6.02774304e-08 -3.78683014e-05]]
Your answer is:
[[-1.18931755e-09  4.45830836e-02  6.02774304e-08 -3.78683014e-05]]
Input is:
[[  4  -1   1  -7 -10  -6   5  -3   7  -4   9  -6  -1   9   8   4   1  -7
   -4   9  -4  -7  -5   2  -8  -7   3   4  -9  -8   0   2   4  -2  -6  -1
   -7  -2   0   9   0   7   3   9  -1  -8   9  -3   7   4  -7   4   3  -1
   -6   0   3  -7  -6   3  -9  -3   1 -10]
 [  9   8  -9   1  -6  -3  -8   0   6 -10   2  -1   7   1   7  -8  -8  -9
   -6   5  -6  -9   3   9   3   4   4   3   2   3  -8   1   0   2   3   3
    4  -1   3  -9   0  -7   4   4 -10  -7  -1  -6   1  -6  -6   8  -5  -2
    4   8   1  -9   7 -10  -2   0   6   6]
 [ -4  -9  -3  -3   3  -6   0 -10   4  -1  -4   9   4  -6   8   5   1  -7
   -4   5  -6  -7   0  -5  -7  -2   0   8  -9   6  -3  -5   5  -5   6  -1
   -5  -7   5   1  -5  -8  -1   4   8  -6  -5   4 -10 -10   2   2  -4   3
   -5  -2   4  -5   8  -3   2   6  -5   8]
 [  6  -5  -2  -4  -8  -9  -8   8  -8   5   5  -5  -5   8   3   3   2   3
    6   8  -8  -4  -8   4  -9  -6  -5   6   7  -9   6  -6   7   3  -9   1
    0   8  -7  -7   7   6   0  -3  -6   9  -2  -3   9  -4   5   0   3  -9
    1   6  -4  -1   5  -2  -4   6   6 -10]
 [ -4   1   0  -4  -9  -6   9  -6  -7   2   7  -1   1   4   0  -4   2   7
    0   8   9   3   3  -5   3   2   4   4   9  -5  -6  -8   4   8  -7  -1
    0   2  -2  -7   9   6  -5  -5 -10  -1  -1  -2  -2   0   8  -6  -1   7
   -1  -6  -3   2  -7   0   0  -6  -9  -7]]
label is:
[[0. 0. 1. 0. 0. 0. 0. 0. 0. 0.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 0. 1.]
 [0. 0. 0. 0. 0. 0. 0. 1. 0. 0.]]
```

```
z is:
[[-1.         -1.         -1.         -1.        ]
 [-1.         -1.         -0.99760207  0.99999912]
 [-1.         -1.         -1.         -1.        ]
 [ 0.99999732 -1.          0.29732604  1.        ]
 [-1.         -1.         -1.         -0.99999994]]
y is:
[[0.10945934 0.08334404 0.04631752 0.24448291 0.11310444 0.03144417
  0.13070517 0.06765538 0.1186374  0.05484964]
 [0.12458002 0.09088099 0.05972316 0.13520675 0.06849803 0.08643036
  0.21441886 0.08758805 0.07508796 0.05758582]
 [0.10945934 0.08334404 0.04631752 0.24448291 0.11310444 0.03144417
  0.13070517 0.06765538 0.1186374  0.05484964]
 [0.06174527 0.20049365 0.10497667 0.10438831 0.15812121 0.08727014
  0.14165548 0.04780293 0.03252983 0.0610165 ]
 [0.10945934 0.08334404 0.04631752 0.2444829  0.11310444 0.03144417
  0.13070517 0.06765538 0.11863739 0.05484964]]
GT is:
[[ 1.13867707e-06 -8.49358811e-15 -2.20253536e-01 -4.03834343e-08]]
Your answer is:
[[ 1.13867707e-06 -8.49358811e-15 -2.20253536e-01 -4.03834343e-08]]
Input is:
[[  3   3  -1  -5   8  -6   0  -5   3  -8  -3   0   3  -3  -8   0   2  -6
   -8   4   4   4  -3   5   3   3   9   0  -5   9   0  -4   2   4  -7   6
    0  -3  -2   0  -3   6   9   4   3   9   6   5  -4   2  -9  -8   0   3
   -7   2  -5 -10  -6   9   8  -9 -10   7]
 [ -5   2   4  -6   9  -9   9   6   4  -9 -10  -8  -5  -9  -8   1 -10  -7
   -2  -2  -1  -2  -4   1  -2  -5   3   0 -10   2 -10   4  -9  -7   2  -6
    1   9   4   8   6  -2   2  -8  -4  -1  -8   6  -5  -5   4  -6   6   9
   -2   5 -10  -8  -3  -9   8  -7  -1   1]
 [ -7  -3   5   0  -2  -3   2   2   8   2   5  -5  -3   0  -1  -7   2   3
    1  -5  -2   0  -4   9   4  -2   2 -10   5   6 -10  -4   2 -10 -10   3
  -10   9   0  -8   5   6   2   7   8   2   3 -10   4  -6  -9   9  -8   6
    5  -2   6   1  -3   9  -2  -9  -6  -6]
 [ -8  -8  -6  -6  -4   5  -8  -2   9  -1 -10  -3 -10  -4   1   2  -5  -8
   -5   9   1   2   6   4  -1   7  -8   5  -7   6   0  -5  -8   9  -1   0
    7   0  -2 -10   8 -10   7   4   3  -2   5  -3   8  -6  -5  -9   0   8
    0  -3   4   7  -1  -1  -4   0   1  -9]
 [ -3   0   0  -5  -4  -8  -8   7  -4   0  -5   8   0 -10   1  -2  -5  -7
    8  -4  -1  -6  -4   5   9   7  -5  -5   5   8   5   2 -10  -4   4  -1
    2   7  -7  -2  -5   6  -8   7   1   0  -4   4  -4   4   0  -4  -5   1
    4  -5   5  -8  -2  -4   9   1   4  -5]]
label is:
[[0. 0. 0. 1. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 1. 0. 0. 0. 0.]
 [0. 1. 0. 0. 0. 0. 0. 0. 0. 0.]
 [1. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 1. 0. 0.]]
z is:
[[ 1.         -1.         -1.         -1.        ]
 [-1.         -1.         -1.         -1.        ]
 [ 0.74432871 -1.         -0.99488051 -1.        ]
```

```
 [-1.         -1.         -1.         -1.        ]
 [-1.         -1.         -1.         -0.99285941]]
y is:
[[0.05090803 0.1215061  0.1189546  0.08716085 0.25785401 0.14355216
  0.06115588 0.07634997 0.0571687  0.0253897 ]
 [0.07501319 0.20844599 0.10377959 0.07237214 0.19973694 0.07910619
  0.03227752 0.11710699 0.09515978 0.01700167]
 [0.05402358 0.13138523 0.11816283 0.08593467 0.25182375 0.13412692
  0.05701094 0.08148587 0.06160779 0.02443841]
 [0.07501319 0.20844599 0.10377959 0.07237214 0.19973694 0.07910619
  0.03227752 0.11710699 0.09515978 0.01700167]
 [0.0752356  0.2084477  0.1036942  0.07234309 0.19927046 0.07915927
  0.03233525 0.11705607 0.09541726 0.0170411 ]]
GT is:
[[1.34727474e-01 2.27292491e-17 8.98526820e-04 8.69358054e-04]]
Your answer is:
[[1.34727474e-01 2.27292491e-17 8.98526820e-04 8.69358054e-04]]
Input is:
[[ -3  -9   9   9  -9  -7   7  -4  -5  -8  -5   7  -1  -6  -6  -3   8  -5
   -5   0  -1  -8   5   9   5  -5 -10   0   3   9  -2   8  -9   9   2   2
    7   5  -8   6   3   6  -7  -8   3   5   8   7  -8   8  -7  -2   8  -9
   -4   9   2   2  -8   3   3  -6   5   8]
 [  8  -8  -3   2  -9   1   5  -5   8   9   9   0   5 -10  -5   2  -5   4
   -5   6  -8   5  -3   1   1  -7  -4  -9   9  -2  -4  -9  -7  -1   8   6
   -6   5   7   0  -3  -7 -10   0   3   6   4   3   1  -4  -4   7  -6  -6
   -8  -6   1   1  -7   2   2  -9   7  -7]
 [  1   6   9   2  -4   7  -7   7   3   0  -6  -8   9  -6  -5   8 -10   8
    8   2   9   9   7   3   7  -6   7 -10  -8  -8   4  -4  -6 -10  -8   3
    2  -8  -9   9  -7  -6   5  -2   9   4  -4   4   9   2  -3   5   8   9
   -7  -7   3  -4   9  -8   7   8  -7   0]
 [ -2  -5   6  -5  -3   4   3   0  -3   0   8  -3   3 -10  -5   1   4 -10
    0   9  -7  -8  -8  -4  -3   2   1 -10   8  -9  -6   3   2  -8  -8   6
    9  -8  -6   7  -6  -2  -8 -10  -9   9  -3   5  -5   4   2  -6   9   1
   -5   7  -7   3  -9   5   3   2   6  -2]
 [ -1 -10   0   5   0 -10  -4   8   4   0  -6   8  -5   9   7  -7   5   5
    2   6  -1   5 -10   1  -5   3  -3 -10  -7   9   2  -8  -7  -1   8   1
    0  -8   5   1   8  -6   6  -9 -10   4  -2  -8   2   6   1  -4  -4   1
    8   5  -4  -9   3  -1   5  -3   9  -8]]
label is:
[[0. 0. 0. 0. 1. 0. 0. 0. 0. 0.]
 [0. 1. 0. 0. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 1. 0. 0. 0.]
 [0. 0. 0. 1. 0. 0. 0. 0. 0. 0.]
 [0. 0. 0. 0. 0. 0. 0. 0. 0. 1.]]
z is:
[[-0.99999321  1.          1.          0.21734066]
 [-0.99999999 -1.         -1.         -0.9959169 ]
 [ 1.          1.          1.         -0.63675931]
 [-1.         -1.         -1.         -1.        ]
 [-1.         -1.         -0.99981458  0.99464142]]
y is:
[[0.03036933 0.05145523 0.07909945 0.07223058 0.09954236 0.33018011
```

```
 0.0492672  0.03824304 0.13612333 0.11348938]
[0.08200634 0.12655647 0.18669862 0.08167798 0.06824498 0.09191322
 0.07368727 0.09446284 0.05484352 0.13990876]
[0.07437353 0.07764497 0.09606226 0.04426968 0.10502678 0.10944576
 0.08005235 0.07507535 0.26846044 0.06958888]
[0.08202761 0.12675072 0.18657506 0.08161085 0.06814008 0.09173874
 0.07375738 0.09453284 0.05479185 0.14007487]
[0.06197603 0.05138794 0.22110005 0.10460255 0.12390611 0.19905531
 0.03975062 0.05645653 0.07447624 0.06728863]]
GT is:
[[-3.17692443e-06  5.74596462e-15 -9.71585378e-05  1.00750264e-02]]
Your answer is:
[[-3.17692443e-06  5.74596462e-15 -9.71585378e-05  1.00750264e-02]]
```

test_predict (test_MLP.TestMLP) (3/3)

ten tests for predict() with random weights and inputs
Input is:
[[-4 -3 -8 9 -7 6 8 -3 0 -5 -6 3 -8 -3 8 -10 7 3
-7 -7 -1 6 1 -5 1 0 -6 -3 5 0 -6 -8 -2 -2 -10 9
8 -3 1 7 0 2 6 8 -7 -9 7 -9 -10 -10 6 -2 -6 5
5 -9 -4 8 4 -8 -8 4 4 5]
[0 -2 -6 1 6 4 3 1 3 -2 -10 -9 6 -1 -9 -2 -3 1
0 -1 -6 -6 -7 -1 7 -6 -10 1 6 -10 -3 5 1 -9 9 -6
-3 -10 1 -7 5 6 0 -1 3 -6 -10 8 -2 -10 -9 -1 2 -5
1 -8 3 7 -2 -7 -7 9 -8 -4]
[6 3 -9 5 -6 -7 -8 -4 -3 3 -2 -5 6 -6 3 1 -3 7
-2 -1 4 8 -5 8 4 -1 -4 2 -5 -3 -9 3 8 6 -2 1
-8 -8 9 7 -1 -3 9 -8 -4 3 9 -1 -10 9 -2 -3 7 7
3 7 5 -9 2 -1 7 -2 -5 1]
[4 2 -6 -9 6 -2 8 -9 -7 8 -2 2 -10 -3 1 2 9 -2
-10 5 0 -2 1 1 -7 3 -8 3 -7 -6 -2 -3 2 -7 7 -3
1 -10 -7 -4 0 -2 -6 -6 -5 6 -6 6 3 -2 8 8 1 -5
8 -5 5 6 2 6 5 7 7 0]
[3 -5 3 -2 0 -3 -7 1 -10 -10 9 7 8 -2 7 -1 4 -5
-8 8 -10 2 -5 -4 2 -6 3 6 1 -9 9 8 -7 7 6 -5
5 -6 8 -10 -5 2 2 -10 5 4 6 3 5 9 -5 4 -2 4
6 5 5 -1 1 -4 2 -4 0 5]]
GT is:
[8. 8. 3. 8. 3.]
Your answer is:
[8. 8. 3. 8. 3.]
Input is:
[[5 -9 -2 0 3 -8 -5 2 -1 -8 9 -5 -5 9 7 6 -3 -10
-3 3 1 2 9 -2 -1 -6 -9 -3 -6 3 -1 -5 4 -6 -3 -9
2 -3 5 -9 -10 7 -3 -2 -7 2 9 3 -3 3 -1 1 -2 -2
-10 7 -5 1 -4 2 0 9 -3 7]
[6 3 0 3 5 -10 -3 2 5 -3 -10 1 -1 -7 -1 0 0 6
-2 8 -5 0 -5 -9 8 -6 -10 -5 1 -2 -2 3 -9 -3 -5 -4
-10 7 -10 -9 -2 7 0 -9 -8 -5 -2 -2 -4 -4 -6 -9 6 -8
-8 8 3 -10 -4 -4 -2 -3 3 5]
[-7 -3 5 -3 -1 1 3 -9 1 0 6 -10 3 5 -5 -9 -7 -2
-4 9 2 -3 -4 4 9 5 4 -7 9 1 9 3 -9 -7 -3 -5
-2 -8 -4 7 -7 -10 -8 5 4 7 4 6 -6 1 2 -7 8 -7
6 -2 8 6 -7 -7 7 6 7 9]
[7 -8 -2 -9 -1 2 2 -5 1 -9 7 -6 -4 7 4 3 1 9
-7 4 6 -3 8 5 9 6 -6 -8 -9 -5 -5 4 5 7 -4 8
-2 -4 -7 5 8 -4 -9 3 6 8 -7 6 -2 -4 6 -4 -2 -6
-4 -8 3 3 6 -7 -10 -2 3 1]
[-6 6 -1 0 0 -6 -6 0 5 -6 -5 -9 -10 -6 -9 6 -10 -4
8 5 6 -6 -4 7 6 -2 7 -6 -6 -10 -9 -2 -10 1 -4 -7
-3 0 -7 -7 8 -10 7 -7 0 7 4 9 -9 7 -1 -5 -10 -3
-6 -2 -9 -2 7 -9 7 -6 7 7]]
GT is:
[8. 8. 1. 8. 8.]
Your answer is:
[8. 8. 1. 8. 8.]
Input is:

```
[[ 9 -4  6 -5  4  2 -4 -9 -4 -5  4 -9 -9 -3 -2 -2  5 -7
   4 -3 -4 -5  5 -3 -7 -5  0  3  1  0  7  7 -7  2  7 -6
   0 -1  0 -8 -8 -6  7 -5  5  8 -10 -7 -5 -9  6  9  8 -3
  -3  9  3  6  3  0 -6 -2  9 -7]
 [ 0  9  9 -1 -5  9  3  2  6 -8  7 -4  3  6  1  1  8 -3
   2  9 -8  9  4  4 -9 -7 -9  1 -7 -10 -2 -1  2  7 -3  3
  -6 -6 -5 -2  1 -10 -8 -4  4 -2 -1  4  9  9  1  7  9 -5
   6  0 -1  9 -9 -6  2 -1 -3 -2]
 [ -9 -8  3 -9 -2 -4 -3 -8 -3  5 -2  9 -8  6 -6  7 -1  8
   7  8  9 -10  0 -8 -6 -2 -2 -1  0  8  1  6  9 -5  7 -8
   1  6  6  7  6  9 -1 -4  9  1 -6 -3  6 -1 -8  1  6 -10
  -6 -10 -8 -9 -4 -9 -10 -1 -8  4]
 [ -4 -4 -5 -7  5 -5 -1  8  4  0  5  1 -3  2  3  6 -1  3
  -1 -5 -10  5  8 -1  4 -5  3 -5 -8 -10 -3 -8  9  0 -6 -8
   2  4  8  7  8  9 -9 -2 -1  2 -2  1 -6  4 -5  5  1  2
  -9  5 -5  3 -9  2 -2  8  6  6]
 [ 7 -8  8 -1 -6 -3 -10 -7  2  5  0 -7 -2  7  2  6 -5 -3
   4 -8  2  3 -10  9  1 -10  3  2 -3 -7 -9  3 -5 -10 -5 -10
   2  6  5  2 -10 -8 -9 -8  5 -10 -3 -4  1  0 -10  4  5  6
  -2  5  0 -2  6  3 -4 -7  6  7]]
GT is:
[1. 2. 1. 5. 1.]
Your answer is:
[1. 2. 1. 5. 1.]
Input is:
[[ 0  8  2  2 -6 -3 -6 -8 -3 -10 -9 -4  6 -8 -10 -6 -3  0
   4  5 -6 -1 -6  2  9 -7 -7 -5  1  0  4 -8  7 -7  8  1
   8 -2 -5  3 -8 -7 -5  7  4  1 -9 -6 -2  7 -1 -7 -6  6
   7  5 -5 -10  5 -6 -6  6 -7  4]
 [ -9 -3  3  6 -9 -7 -9 -10  6 -10  5 -8  0  7  4  1 -8  3
  -1 -2  4 -9  4 -6 -7  3 -9  8  0  7 -4  5  4 -3  9 -2
  -8  7 -1  5  5 -1 -2 -10  9  4 -4 -10 -7  1  1 -8 -1 -8
   2 -10 -1  6 -3  5  3 -7  5 -4]
 [ -7 -7  2  7  1  3  4 -9 -6  8 -5  7 -9 -5  9 -6  6  0
  -6 -10 -1 -4 -5  1 -10 -10  2 -6 -6 -7 -5  0  8  8  2 -7
  -2 -2  7 -10 -3 -4  0 -6  0 -5  2 -7  0 -6 -8  7 -9 -1
  -2  4 -9  5 -8  7 -1  4  8 -2]
 [-10  1 -10 -9 -1 -2 -4 -8 -10  5 -6  4 -8 -1  7  2  7  6
  -7  1  4  2 -8 -2  7  3 -4 -4  2  6 -5  7  0  5  5 -9
   9  3 -4 -6 -2 -1  7  3  0  4  7 -8  7 -4 -2  8  9  7
  -7  8  9 -5 -9  7 -9  2  0 -5]
 [ -8 -2  0 -8  9  7 -8  0 -9 -6  0  0  4  8 -9  5 -6  3
  -4  9  2 -8 -2 -2 -5  9 -2  4  3  7  9  4 -4  5 -9 -7
   8 -9  2 -8 -3 -8  9  1 -6  1 -10 -9 -9 -3 -8  9 -10 -2
   5  2  2  0  2  1 -3  0  1  0]]
GT is:
[2. 2. 2. 7. 2.]
Your answer is:
[2. 2. 2. 7. 2.]
Input is:
[[ -5  4 -8  9 -2 -8  0 -9  2  8  0  1  7 -1 -10 -1  4 -7
  -4 -9 -5 -5  9  4 -7 -4  8 -9  1  3 -9  8  9 -10 -10  3
```

```
  -7   2   8  -2  -9  -3  -4  -4   1   6  -9   1 -10   9  -9   1  -2   4
   9  -6   8  -4   9   8  -9   9   5   7]
 [  4  -7  -1   1 -10  -3   4   4   9  -1 -10   3   0 -10   9   5   2  -4
  -8   3  -4  -5   8  -3  -9   3   7  -8   4  -2   9   0  -5   7  -7 -10
  -6  -8 -10  -1  -1  -7   0   8  -1   4   9   6   8  -8   0  -1   9  -6
   3   1   9   2  -3  -9   8  -9   9  -2]
 [  6  -6   6 -10  -4  -5   8  -1   5   9   0   9  -3  -1   6  -2  -4   1
  -4  -3 -10  -1   6   3   2  -1  -7   9   9 -10  -4 -10   0   5   1  -3
  -4   9   9   6  -9  -8   2   9   1   7   4  -8   0   9   1   9   4   9
  -4  -7  -8   4   2   8  -5   2  -4   3]
 [  8  -5  -4   8  -4  -7   0  -1   8   2   7   4   8  -2   7   3  -1   8
   5  -6   9  -5  -8   8  -5   9  -2  -8   9   4  -1   1   3  -7  -5  -4
   4   9   9   1  -2  -4  -1 -10   1   7 -10   2   1 -10  -1   8 -10  -2
  -2  -1  -7  -4  -1  -4  -6   7  -8   0]
 [  8   1  -9   0  -8   8 -10   0  -7  -5   5   1  -9  -8   2   4   6  -3
   7  -2  -7  -6   0  -9  -8   5  -4  -1   4   7   6   9 -10   3   4   2
  -3   2  -9  -9   1   4   0  -7  -5   4   0   6  -5  -3   0  -1   3  -5
  -6  -9  -4  -2  -2   2   9   7   8   5]]
GT is:
[7. 7. 7. 5. 5.]
Your answer is:
[7. 7. 7. 5. 5.]
Input is:
[[-10   4   4  -3 -10 -10   0  -5   9  -4  -8   5 -10  -7   5  -4  -5   5
  -6   0   1 -10 -10  -5   8   3  -6  -3  -4  -9  -3 -10   4   0   1   0
   5  -2  -5  -5   3   1   2  -5   8  -1   4   8  -7  -8  -5   7   4   2
   9   2 -10  -4   9  -8  -8  -7   9   6]
 [  9   1  -7  -9   8   6   0  -4  -6  -2   9   6   6   1   2  -1   0  -1
  -7   9   3   6  -6   8   7 -10  -6 -10  -7   1  -5  -2  -5   6   3 -10
   6   6 -10   8   3  -8   5  -9  -3   2  -1   3   3  -2  -4   6  -4  -8
  -9   0  -5   7   7   7  -5   1  -1  -4]
 [  8   8   8   6  -8   1   4   0  -6   8  -3  -8  -2   7   7  -5   4   6
  -1 -10   0   2  -4  -8  -7  -8   2  -5  -7   4  -6  -7  -1  -9  -3   8
   8   7   6  -2 -10  -2   6   9  -8   5   2   8   1  -9  -4  -3  -9  -7
   7   6   4   0   8   5  -8 -10  -8   4]
 [  8   3   9   2  -9   1   6   7  -9   8  -5  -9   2   7  -6   5   2  -6
   4   1  -7   4   0   4  -4   7  -3   7   7  -4  -5  -5   0   4   4   3
   2  -4  -1  -9  -7  -9 -10 -10  -7   7  -1   1  -2   4  -9   0   1  -7
  -1   8  -8  -1 -10   5  -1  -8   3  -4]
 [  9  -4  -5 -10   6   5   3   8  -4   2   6  -3 -10  -4  -3  -3  -8  -3
  -8   9   0   0  -4  -9   6  -5   8  -5   4  -8   9  -2  -3   1   6  -9
 -10  -1  -8   1  -6  -2  -3   7  -6   7   1  -4   5   5  -1  -8  -3   4
  -3   5  -5   8  -2  -5 -10   4  -2 -10]]
GT is:
[4. 9. 4. 4. 4.]
Your answer is:
[4. 9. 4. 4. 4.]
Input is:
[[ 5  -8  -1   8   2  -4   1   6  -4  -6  -5   6   3  -4   7  -2  -4   3
   1   6  -8  -3   3   8   2  -3   0  -5   3  -4  -4 -10  -3   3  -2  -8
   1  -8  -3  -3  -4   2   6   6   7  -5  -2   7   8   8   3   0   0  -3
   5  -9  -9   0  -1  -4   4   4   8  -7]
```

```
[ 5 -10  8  0  8 -6  7  4 -4  7 -2 -7  3 -2  6  8  2  6
  8 -6  1 -3 -10  9  4  2 -2 -4 -5  4 -8  3  2 -10 -4  9
  4 -7  5 -6 -2 -7  6  4 -6  7  2 -7  0 -1 -8  0  4 -3
  2 -5 -2  3 -7 -2 -1  3  7  6]
[ -1 -8 -9  4 -5  6  1 -9 -5 -3 -7  7  6  0 -1  9  3 -6
  1  8  8 -1 -4 -2  5  5 -4 -8 -2 -3  8  4 -4 -2  7  7
 -4  6 -7  3  0  4 -6 -6  1  5 -8  3  1  9 -3 -10 -6  2
  0  8  8 -4 -9  4  7 -6 -6  4]
[-10  5 -9  7 -10 -3 -9  7 -6  8 -8 -5  2 -10  1 -5 -5 -4
  5  9 -2  3 -7 -9 -9 -10 -1  9 -2 -1  3  4 -2  6  4  4
  6  9  7  8  9  6  8  5 -4  0 -9  3 -7 -9 -9  9 -8  2
 -7 -4 -1  0  5 -3 -6  4 -5  6]
[ -1  9 -10  7 -6 -3 -4  1 -9  5  1 -5  5 -5  2 -6 -4 -6
  7 -5  2  7  5  6  3 -3 -1 -4 -5  4  0 -5  6 -10  3  6
 -2 -3 -10  5 -4  6 -4 -5 -2 -5  1 -9  1 -9 -7 -9  6  3
  2  7 -10 -9  1 -2 -1  0  3 -4]]
GT is:
[1. 4. 3. 3. 3.]
Your answer is:
[1. 4. 3. 3. 3.]
Input is:
[[ 4 -2  1 -7 -1  4 -8 -5 -8  0 -6 -3 -2 -9 -10 -6  2  3
  -2  6  9 -5 -7 -10 -9  0  4  8 -4  0  0 -1  2 -1  5  6
  -5  8 -9 -7 -3 -1 -4  9 -5  4 -4  2  4  4  8 -6 -1  1
  -7 -8  1 -10  5 -10  6  4  2  7]
[ 6  0 -10 -6  8  5  0 -10  3  1  5 -4 -1 -5 -7 -2  3  1
  7  8  3 -6 -1  7  1  6  3  4 -8  4  4  2  8  6 -9  6
 -6 -2  6 -1  7 -4  4  6  2 -6 -4 -10  4 -10  2  6  0  2
 -5  6  9 -6 -9  5 -4 -10  8  5]
[ -7  9 -8  9 -8 -8  5 -5 -4  3 -2  8 -2 -10  5  6 -5  0
  2  9 -5  0  8 -9  3 -3  4 -4 -9  4  0 -4 -9 -1  1 -1
  0  2  6 -2  3 -9 -4 -6 -3  0  7  3  6 -5 -8 -10 -10  9
 -10 -4 -10 -4  5  1 -10 -4  5  6]
[ -7 -4 -2 -8 -4 -8  0  7 -1  3 -4 -8  3 -2 -4 -10  3  9
  8  7  8  2 -4  0 -4 -8 -4 -2 -3 -10 -3  7 -6 -8  8  8
  9  1  5 -1 -1  4  8 -10  2 -3 -5 -10  9  2  7  2 -2 -6
 -10 -7  9  1 -10 -7 -4 -4 -7  0]
[ 8 -8 -4 -10  3 -2  8 -6  3 -6 -5 -3 -8  6 -7 -6  5  3
  3 -3 -8 -9 -2  0 -3 -8  1 -2  4  0 -10  9  0 -10  0 -8
  4  6 -10  1  5  4  0  3 -1 -1 -5  5  9 -9  5  5  2 -7
 -6 -8  3  2 -8  1  6 -6 -6 -4]]
GT is:
[9. 7. 9. 9. 9.]
Your answer is:
[9. 7. 9. 9. 9.]
Input is:
[[ 2  3 -3 -9  2 -9  5 -5  4  5  2 -3 -9 -3 -7  7 -4  1
  -6 -2  9 -5 -1 -1 -4 -4  0  9 -8 -2 -2  1 -7 -9 -4  5
  -4  4  3  4 -10  1  3  5  0  4 -1  8  1  5 -6  1  1 -10
  4 -9  8 -4  7  7  9  8 -1 -9]
[ -1  4 -3  5  8 -7 -2  6  2 -8  7 -5 -5  1 -9  9 -5 -7
  7 -9  3 -2 -1 -8 -2 -6 -3 -3 -7 -4 -2 -1  9 -6 -7 -8
```

```
   9 -1 -3  2  3  9  4 -9  3 -4 -5 -5 -8 -2 -4 -6 -10 -1
   8  1 -4 -3 -1  8 -9 -10  7 -8]
 [ -2 -10  0 -9  0 -10  2 -10 -1 -10 -2  2 -9  0  7  2  4 -7
  -4 -6 -1  3 -3 -3  1 -1  1 -8  0 -1  6 -10  1  5  3 -6
   8  1 -8  0 -2 -5  8 -8  2  9  6 -5 -3  9  2  1  7 -2
  -7 -7  0 -2  1  9  8 -10 -10 -4]
 [ -5  5  0 -3 -7  1 -6  2  9 -6 -10 -10 -10  3  9  8 -3 -9
  -9  4 -10 -5  7  0 -5  4  7 -2  0 -3 -3  4 -9 -4  1 -8
  -3  7 -8  5  8 -10 -7  2 -4  0 -10  1  0 -4 -7 -4  6  0
  -1 -6  0  4 -6  8  9  3  2 -6]
 [  0  5 -5 -3 -9  1  6  2  7 -3  9 -2 -2  4 -5  0  2  8
 -10  5  1 -8 -1  3  1  7 -2 -6 -7  2  1  3 -8  1  1  3
  -2  6 -10 -1 -6 -6 -10 -2  5 -10  6  2 -7  5 -1  8 -6  4
  -4 -9  3 -9 -5 -2 -2 -2  4  2]]
GT is:
[9. 9. 9. 9. 9.]
Your answer is:
[9. 9. 9. 9. 9.]
Input is:
[[  0 -5  1 -1  9  0  3 -5 -1  5  7 -3 -5 -6 -7  2 -2 -10
   5 -10 -1 -4  0 -5 -9  0 -8  4  6 -6  3  6  3  1  6 -4
  -2  6 -9  1  4 -9  7  5 -3  1  5 -7 -2  2 -6  6  2 -1
   0  4 -4  2  0  9 -5  7  8 -8]
 [  2  2 -3  4  8  7 -6 -4  8  3  1  4  7  6  9 -1  2 -5
   2 -8  2 -10 -4  5  5  0 -6  2 -1  7  5 -7 -3 -6  7  1
   9  0  5  5 -5 -3 -7  2  9 -10 -8  8 -6 -9  8 -3 -4 -8
   9  4 -6 -6  4 -5  8  0  9 -6]
 [ -1  0  9 -8 -3 -9  9 -1  7 -9 -1  8 -10 -6  8  3 -3  2
  -3 -10 -5  0 -1 -4 -8 -4  1 -9  4  6 -3 -9  9 -4 -2  7
   0  5  0 -3  7  5 -2  8  6 -2  0 -6  0  4  4  3  7  2
   7  4 -2 -3  8 -10 -1 -8  8  1]
 [  9  4 -2 -6 -2  0  5 -4  8  1 -4 -7 -5  1 -3 -10  4  0
  -8  0  0  6 -3  3 -7  7 -2 -4  5  7 -6 -8 -5  8 -3  1
 -10  1 -8 -6 -2 -2 -1  7 -9  6  9 -1  2 -1 -9 -6  3  4
   9 -10 -2 -9 -1  7  8 -8  9  8]
 [  7 -8  6 -8 -4 -2 -9 -6 -2 -10  2  2 -3  6  4 -7  9  9
   3  1 -9 -8  3 -9 -7 -1  3 -5  7 -8 -7  6 -7 -6 -5 -6
  -8  1  8 -8  6 -5  9  6  8  0  1 -7  0  5  0 -7 -4  8
  -1  1  2  3  1 -10 -6  4  5  2]]
GT is:
[8. 4. 4. 8. 8.]
Your answer is:
[8. 4. 4. 8. 8.]
```

test_update (test_MLP.TestMLP) (3/3)

ten tests for update() with random weights and inputs
our sample gra_w, gra_w0, gra_v, gra_v0 are:
[2 -6 -1 -6]
gt updated weights are:
[[0.59238038 0.0080199   0.64314022 0.08231359]
 [0.25788396 0.76764953 0.16275048 0.16226845]
 [0.08120617 0.45590807 0.09202213 0.46908422]
 [0.22297246 0.59055632 0.37695218 0.71448525]
 [0.3318589   0.53307183 0.87278274 0.3563969]
 [0.49468128 0.46538259 0.9304978   0.09716762]
 [0.91521434 0.05561043 0.83173144 0.03152885]
 [0.88233622 0.42067599 0.57072498 0.36918997]
 [0.28948345 0.2060216   0.13271301 0.4004887]
 [0.50690507 0.78152579 0.18713978 0.83292165]
 [0.31282501 0.36001898 0.74433626 0.85671241]
 [0.42636661 0.72855821 0.93950556 0.37857019]
 [0.42383599 0.23021507 0.12683067 0.37718747]
 [0.01995997 0.7054043   0.53158713 0.90026819]
 [0.20817142 0.45437195 0.04146763 0.587355]
 [0.40151046 0.67260605 0.85793927 0.9436882]
 [0.16079327 0.51381475 0.59730379 0.35608015]
 [0.68377427 0.25287829 0.36962457 0.76882625]
 [0.86461403 0.09948161 0.09253354 0.15415547]
 [0.23544889 -0.00574396 0.75120569 0.41006902]
 [0.3975053   0.81956026 0.43817843 0.98917223]
 [0.21445267 0.94037565 0.06473147 0.4727053]
 [0.73692525 0.49689252 0.909508   0.74706964]
 [0.77586712 0.5743575   0.23636487 0.41151422]
 [0.62374412 0.5310744   0.01736632 0.72034523]
 [0.63110732 0.26812319 0.54455131 0.7029079]
 [0.2957909   0.67995091 0.82845771 0.7134553]
 [0.42245411 0.63635879 0.46378157 0.02083644]
 [0.42233859 0.76649022 0.959525   0.3222776]
 [0.52915126 0.62019699 0.71971743 0.69197133]
 [0.49257009 0.71233467 0.46781095 0.84969868]
 [0.70377867 0.41373006 0.25851797 0.41283617]
 [0.6739925   0.73315456 0.76478411 0.51723293]
 [0.58040801 0.74174018 0.71326331 0.59279304]
 [0.41526414 0.80371313 0.21998118 0.43033537]
 [0.53689862 0.4722801   0.38085157 0.57040978]
 [0.53728435 0.4979196   0.39748547 0.4025701]
 [0.19389158 0.3957149   0.33794833 0.91845676]
 [0.2222974   0.33643032 0.16715304 0.70999632]
 [0.10038844 0.62943682 0.23682032 0.97926295]
 [0.39314449 0.98980276 0.23965071 -0.00199314]
 [0.09342062 0.08188426 -0.00592628 0.42565905]
 [0.62118826 0.92869708 0.21427244 0.51787142]
 [-0.00736821 0.83727163 0.63982346 0.68095034]
 [0.65578866 0.57770611 0.44345327 0.62997355]
 [0.4880034   0.77207349 0.23134499 0.24073141]
 [0.4800322   0.34325654 0.37144832 0.69096336]
 [0.37723105 0.00153899 0.42876744 0.83966432]

```
 [ 0.4534884   0.29289482  0.24343491  0.72481795]
 [ 0.85167778  0.20177165  0.46481277  0.29288074]
 [ 0.74985496  0.58836428  0.17486948  0.01469674]
 [ 0.27389557  0.89624625  0.97778203  0.11642582]
 [ 0.33104929  0.7584899   0.93782513  0.62957441]
 [ 0.20475553  0.23629298  0.58195734  0.10197862]
 [ 0.85942604  0.67593375  0.97753656  0.55781005]
 [ 0.39174686  0.91613357  0.81870152  0.24672346]
 [ 0.58391015  0.02197894  0.78345118  0.0310743 ]
 [ 0.12772447  0.27905607  0.86014906  0.40190413]
 [ 0.45231965  0.53201763  0.29919951  0.76665329]
 [ 0.26495745  0.78293319  0.84216164  0.94699125]
 [ 0.78322042  0.84488991  0.67628855  0.41210859]
 [ 0.57492529  0.55284134  0.09610497  0.13217623]
 [ 0.11876515  0.90959295  0.57357107  0.04900784]
 [ 0.11276378  0.84792155  0.31414548  0.02066044]]
[[0.12895106 0.65287165 0.54834203 0.49317794]]
[[0.57035133 0.53987323 0.22243839 0.63195061 0.83818203 0.61285017
  0.55242247 0.59456133 0.80338327 0.01741239]
 [0.99603835 0.6275038  0.84696905 1.00404416 0.11232802 0.56622285
  0.77831966 0.06839977 0.29317825 0.10172622]
 [0.89426091 0.81903656 0.52829264 0.3256782  0.5072131  0.57646128
  0.73381049 0.7012464  0.29866522 0.96519686]
 [0.93420708 0.24384262 0.28432954 0.04075421 0.48371082 0.77258519
  0.31909809 0.94288716 0.55595769 0.68904623]]
[[0.71472927 0.70396217 0.58110999 0.61598016 0.10413818 0.36571276
  0.07828149 0.87982622 0.2576264  0.06498912]]
your updated weights are:
[[ 0.59238038  0.0080199   0.64314022  0.08231359]
 [ 0.25788396  0.76764953  0.16275048  0.16226845]
 [ 0.08120617  0.45590807  0.09202213  0.46908422]
 [ 0.22297246  0.59055632  0.37695218  0.71448525]
 [ 0.3318589   0.53307183  0.87278274  0.3563969 ]
 [ 0.49468128  0.46538259  0.9304978   0.09716762]
 [ 0.91521434  0.05561043  0.83173144  0.03152885]
 [ 0.88233622  0.42067599  0.57072498  0.36918997]
 [ 0.28948345  0.2060216   0.13271301  0.4004887 ]
 [ 0.50690507  0.78152579  0.18713978  0.83292165]
 [ 0.31282501  0.36001898  0.74433626  0.85671241]
 [ 0.42636661  0.72855821  0.93950556  0.37857019]
 [ 0.42383599  0.23021507  0.12683067  0.37718747]
 [ 0.01995997  0.7054043   0.53158713  0.90026819]
 [ 0.20817142  0.45437195  0.04146763  0.587355  ]
 [ 0.40151046  0.67260605  0.85793927  0.9436882 ]
 [ 0.16079327  0.51381475  0.59730379  0.35608015]
 [ 0.68377427  0.25287829  0.36962457  0.76882625]
 [ 0.86461403  0.09948161  0.09253354  0.15415547]
 [ 0.23544889 -0.00574396  0.75120569  0.41006902]
 [ 0.3975053   0.81956026  0.43817843  0.98917223]
 [ 0.21445267  0.94037565  0.06473147  0.4727053 ]
 [ 0.73692525  0.49689252  0.909508    0.74706964]
 [ 0.77586712  0.5743575   0.23636487  0.41151422]
```

```
 [ 0.62374412  0.5310744   0.01736632  0.72034523]
 [ 0.63110732  0.26812319  0.54455131  0.7029079 ]
 [ 0.2957909   0.67995091  0.82845771  0.7134553 ]
 [ 0.42245411  0.63635879  0.46378157  0.02083644]
 [ 0.42233859  0.76649022  0.959525    0.3222776 ]
 [ 0.52915126  0.62019699  0.71971743  0.69197133]
 [ 0.49257009  0.71233467  0.46781095  0.84969868]
 [ 0.70377867  0.41373006  0.25851797  0.41283617]
 [ 0.6739925   0.73315456  0.76478411  0.51723293]
 [ 0.58040801  0.74174018  0.71326331  0.59279304]
 [ 0.41526414  0.80371313  0.21998118  0.43033537]
 [ 0.53689862  0.4722801   0.38085157  0.57040978]
 [ 0.53728435  0.4979196   0.39748547  0.4025701 ]
 [ 0.19389158  0.3957149   0.33794833  0.91845676]
 [ 0.2222974   0.33643032  0.16715304  0.70999632]
 [ 0.10038844  0.62943682  0.23682032  0.97926295]
 [ 0.39314449  0.98980276  0.23965071 -0.00199314]
 [ 0.09342062  0.08188426 -0.00592628  0.42565905]
 [ 0.62118826  0.92869708  0.21427244  0.51787142]
 [-0.00736821  0.83727163  0.63982346  0.68095034]
 [ 0.65578866  0.57770611  0.44345327  0.62997355]
 [ 0.4880034   0.77207349  0.23134499  0.24073141]
 [ 0.4800322   0.34325654  0.37144832  0.69096336]
 [ 0.37723105  0.00153899  0.42876744  0.83966432]
 [ 0.4534884   0.29289482  0.24343491  0.72481795]
 [ 0.85167778  0.20177165  0.46481277  0.29288074]
 [ 0.74985496  0.58836428  0.17486948  0.01469674]
 [ 0.27389557  0.89624625  0.97778203  0.11642582]
 [ 0.33104929  0.7584899   0.93782513  0.62957441]
 [ 0.20475553  0.23629298  0.58195734  0.10197862]
 [ 0.85942604  0.67593375  0.97753656  0.55781005]
 [ 0.39174686  0.91613357  0.81870152  0.24672346]
 [ 0.58391015  0.02197894  0.78345118  0.0310743 ]
 [ 0.12772447  0.27905607  0.86014906  0.40190413]
 [ 0.45231965  0.53201763  0.29919951  0.76665329]
 [ 0.26495745  0.78293319  0.84216164  0.94699125]
 [ 0.78322042  0.84488991  0.67628855  0.41210859]
 [ 0.57492529  0.55284134  0.09610497  0.13217623]
 [ 0.11876515  0.90959295  0.57357107  0.04900784]
 [ 0.11276378  0.84792155  0.31414548  0.02066044]]
[[0.12895106 0.65287165 0.54834203 0.49317794]]
[[0.57035133 0.53987323 0.22243839 0.63195061 0.83818203 0.61285017
  0.55242247 0.59456133 0.80338327 0.01741239]
 [0.99603835 0.6275038  0.84696905 1.00404416 0.11232802 0.56622285
  0.77831966 0.06839977 0.29317825 0.10172622]
 [0.89426091 0.81903656 0.52829264 0.3256782  0.5072131  0.57646128
  0.73381049 0.7012464  0.29866522 0.96519686]
 [0.93420708 0.24384262 0.28432954 0.04075421 0.48371082 0.77258519
  0.31909809 0.94288716 0.55595769 0.68904623]]
[[0.71472927 0.70396217 0.58110999 0.61598016 0.10413818 0.36571276
  0.07828149 0.87982622 0.2576264  0.06498912]]
our sample gra_w, gra_w0, gra_v, gra_v0 are:
```

[0 6 3 -5]
gt updated weights are:
[[0.86300136 0.47160983 0.63762609 0.21911027]
 [0.62904963 0.41048156 0.92493863 0.91129921]
 [0.46257392 0.71057402 0.53524104 0.98806612]
 [0.36677231 0.95813162 0.27714601 0.03450896]
 [0.99146269 0.9879631 0.77805378 0.84936901]
 [0.83938054 0.80419873 0.3612232 0.0160853]
 [0.47069154 0.04510081 0.45318578 0.4686558]
 [0.38851121 0.97822431 0.48579901 0.65640648]
 [0.00986261 0.14058912 0.16649486 0.90479579]
 [0.78625675 0.58085928 0.8793522 0.64668093]
 [0.57560525 0.62259407 0.25231982 0.7867591]
 [0.27739449 0.4308341 0.47127899 0.29377727]
 [0.48511169 0.9395029 0.27737973 0.02721114]
 [0.13084798 0.42859202 0.9494768 0.45696013]
 [0.17791795 0.73376132 0.79422027 0.40103212]
 [0.91568948 0.83512491 0.5993129 0.98160803]
 [0.1668346 0.70569884 0.70186975 0.30424485]
 [0.99817598 0.931671   0.62540335 0.93853443]
 [0.77178087 0.39639363 0.89539183 0.51093677]
 [0.92638156 0.76212502 0.03380402 0.08150023]
 [0.69742373 0.46915206 0.34307939 0.84394011]
 [0.99071154 0.43953421 0.79164788 0.39775532]
 [0.76096438 0.39088189 0.35552945 0.75303031]
 [0.12894975 0.44608745 0.30376695 0.93483254]
 [0.59891128 0.31426963 0.82057754 0.96798159]
 [0.80992059 0.25201986 0.43835249 0.46100355]
 [0.07497432 0.45597866 0.49655584 0.9084092]
 [0.07058065 0.5903034 0.21142585 0.02258554]
 [0.11331801 0.49437661 0.79912454 0.93484628]
 [0.02402934 0.45793197 0.75191462 0.1695608]
 [0.78805177 0.04025451 0.71031217 0.76804366]
 [0.23698584 0.00769505 0.29137272 0.48611768]
 [0.89333349 0.56991095 0.39281735 0.94646757]
 [0.57252527 0.83803279 0.85488464 0.66215138]
 [0.60529127 0.41383499 0.45843777 0.42342771]
 [0.7137479 0.89591942 0.4078103 0.13690147]
 [0.01906034 0.91332208 0.03867912 0.37744743]
 [0.39650994 0.8036698 0.01300125 0.34842999]
 [0.5446479 0.12359883 0.08846682 0.06513595]
 [0.79069005 0.99810668 0.94171656 0.643094]
 [0.48355236 0.11242192 0.52223659 0.25384751]
 [0.36847068 0.38333007 0.53592939 0.39834758]
 [0.45886304 0.33561883 0.05381592 0.75612913]
 [0.62755665 0.16526264 0.61483806 0.52129826]
 [0.88066975 0.82272601 0.18255107 0.17819523]
 [0.69966224 0.29413939 0.33566257 0.17303674]
 [0.92158503 0.51115164 0.61965417 0.26122512]
 [0.38766356 0.394451   0.13290814 0.98264548]
 [0.4923874 0.78587277 0.92986696 0.43722953]
 [0.51950677 0.2646207 0.58240572 0.08002843]

```
 [0.23095355 0.50921399 0.14085271 0.98782123]
 [0.21491541 0.35552292 0.73700545 0.39506788]
 [0.04500285 0.57984245 0.25455889 0.019513  ]
 [0.32480927 0.14810598 0.54587524 0.85786487]
 [0.79702167 0.09403018 0.95863272 0.74498552]
 [0.26565565 0.60265504 0.42246854 0.37156489]
 [0.98913406 0.97598904 0.8603945  0.09351819]
 [0.44972395 0.92784521 0.83611777 0.80343055]
 [0.31609183 0.46819549 0.66190027 0.87317485]
 [0.12254695 0.36984318 0.85913959 0.92496667]
 [0.57872964 0.89642698 0.0538225  0.12097328]
 [0.69067752 0.23737042 0.35258979 0.88284708]
 [0.40206292 0.37646724 0.94492715 0.03332941]
 [0.9237452  0.51666204 0.97725875 0.41802463]]
[[0.28826992 0.14224276 0.56670387 0.77944229]]
[[ 0.26523608  0.14854207  0.36617573  0.00196038  0.14824406  0.91015918
   0.91492873  0.68400673  0.25203493  0.14685711]
 [ 0.28046235  0.56709268  0.64430724  0.33293557  0.39207273  0.64266041
   0.82720617 -0.00696254  0.11290098  0.95115145]
 [ 0.96132411  0.40265022  0.88429115  0.86801582  0.45959865  0.7828428
   0.41696087  0.21910516  0.25233172  0.47457387]
 [ 0.01110428  0.76748173  0.50531586  0.26746579  0.83487256  0.01021306
   0.81051866  0.00315267  0.85829898  0.72249543]]
[[0.60906675 0.24627013 0.8220619  0.64247516 0.81980871 0.87621768
  0.12677787 0.2059593  0.66584125 0.17679463]]
your updated weights are:
[[0.86300136 0.47160983 0.63762609 0.21911027]
 [0.62904963 0.41048156 0.92493863 0.91129921]
 [0.46257392 0.71057402 0.53524104 0.98806612]
 [0.36677231 0.95813162 0.27714601 0.03450896]
 [0.99146269 0.9879631  0.77805378 0.84936901]
 [0.83938054 0.80419873 0.3612232  0.0160853 ]
 [0.47069154 0.04510081 0.45318578 0.4686558 ]
 [0.38851121 0.97822431 0.48579901 0.65640648]
 [0.00986261 0.14058912 0.16649486 0.90479579]
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 [0.27739449 0.4308341  0.47127899 0.29377727]
 [0.48511169 0.9395029  0.27737973 0.02721114]
 [0.13084798 0.42859202 0.9494768  0.45696013]
 [0.17791795 0.73376132 0.79422027 0.40103212]
 [0.91568948 0.83512491 0.5993129  0.98160803]
 [0.1668346  0.70569884 0.70186975 0.30424485]
 [0.99817598 0.931671   0.62540335 0.93853443]
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 [0.92638156 0.76212502 0.03380402 0.08150023]
 [0.69742373 0.46915206 0.34307939 0.84394011]
 [0.99071154 0.43953421 0.79164788 0.39775532]
 [0.76096438 0.39088189 0.35552945 0.75303031]
 [0.12894975 0.44608745 0.30376695 0.93483254]
 [0.59891128 0.31426963 0.82057754 0.96798159]
 [0.80992059 0.25201986 0.43835249 0.46100355]
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 [0.07497432 0.45597866 0.49655584 0.9084092 ]
 [0.07058065 0.5903034  0.21142585 0.02258554]
 [0.11331801 0.49437661 0.79912454 0.93484628]
 [0.02402934 0.45793197 0.75191462 0.1695608 ]
 [0.78805177 0.04025451 0.71031217 0.76804366]
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 [0.57252527 0.83803279 0.85488464 0.66215138]
 [0.60529127 0.41383499 0.45843777 0.42342771]
 [0.7137479  0.89591942 0.4078103  0.13690147]
 [0.01906034 0.91332208 0.03867912 0.37744743]
 [0.39650994 0.8036698  0.01300125 0.34842999]
 [0.5446479  0.12359883 0.08846682 0.06513595]
 [0.79069005 0.99810668 0.94171656 0.643094  ]
 [0.48355236 0.11242192 0.52223659 0.25384751]
 [0.36847068 0.38333007 0.53592939 0.39834758]
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 [0.88066975 0.82272601 0.18255107 0.17819523]
 [0.69966224 0.29413939 0.33566257 0.17303674]
 [0.92158503 0.51115164 0.61965417 0.26122512]
 [0.38766356 0.394451   0.13290814 0.98264548]
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 [0.23095355 0.50921399 0.14085271 0.98782123]
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 [0.79702167 0.09403018 0.95863272 0.74498552]
 [0.26565565 0.60265504 0.42246854 0.37156489]
 [0.98913406 0.97598904 0.8603945  0.09351819]
 [0.44972395 0.92784521 0.83611777 0.80343055]
 [0.31609183 0.46819549 0.66190027 0.87317485]
 [0.12254695 0.36984318 0.85913959 0.92496667]
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 [0.40206292 0.37646724 0.94492715 0.03332941]
 [0.9237452  0.51666204 0.97725875 0.41802463]]
[[0.28826992 0.14224276 0.56670387 0.77944229]]
[[ 0.26523608  0.14854207  0.36617573  0.00196038  0.14824406  0.91015918
   0.91492873  0.68400673  0.25203493  0.14685711]
 [ 0.28046235  0.56709268  0.64430724  0.33293557  0.39207273  0.64266041
   0.82720617 -0.00696254  0.11290098  0.95115145]
 [ 0.96132411  0.40265022  0.88429115  0.86801582  0.45959865  0.7828428
   0.41696087  0.21910516  0.25233172  0.47457387]
 [ 0.01110428  0.76748173  0.50531586  0.26746579  0.83487256  0.01021306
   0.81051866  0.00315267  0.85829898  0.72249543]]
[[0.60906675 0.24627013 0.8220619  0.64247516 0.81980871 0.87621768
  0.12677787 0.2059593  0.66584125 0.17679463]]
our sample gra_w, gra_w0, gra_v, gra_v0 are:
[ 5 -7 -7 -2]
gt updated weights are:
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[[ 6.72045483e-01  2.17108775e-01  9.21914162e-01  8.63197457e-01]
 [ 2.99791926e-01  5.37869333e-01  2.46604519e-01  5.62931126e-01]
 [-4.83795813e-03  5.33408673e-01  9.42721570e-01  5.58306563e-01]
 [ 3.90717572e-01  4.25088628e-01  3.43226672e-01  6.42133114e-01]
 [ 7.62387150e-01  6.40489841e-01  9.07423947e-01  6.76044022e-01]
 [ 7.30554448e-01  9.32685794e-01  2.34957595e-01  8.51618240e-01]
 [ 3.65176332e-01  1.53354925e-01  6.94233730e-01  3.81580770e-01]
 [ 5.93617388e-01  1.71605406e-01  5.44465423e-01  6.14273809e-01]
 [ 7.97382056e-01  6.93176092e-01  4.34731736e-01  4.92695532e-01]
 [ 5.97353190e-01  7.39377243e-01  1.20601149e-01  8.53936681e-01]
 [ 9.41004753e-01  8.76019581e-01  3.53616874e-01  4.79205858e-01]
 [ 7.53659776e-01  8.34646630e-01  4.04277716e-01  1.98481300e-01]
 [ 8.21271869e-01  1.33068226e-01  8.26018733e-01  6.20494425e-02]
 [ 1.06496766e-01  1.61006089e-01  5.25708372e-01  6.33296444e-01]
 [ 8.44016744e-01  5.65954660e-01  5.48756157e-01  1.09415472e-01]
 [ 2.24650820e-01  2.19242228e-01  6.64930312e-01  7.78027162e-01]
 [ 2.59052128e-01  6.06031924e-01  1.32204098e-01  3.40663657e-01]
 [ 6.71823214e-01  9.76324533e-02  7.67835631e-01  8.14423143e-02]
 [ 2.88622443e-02  1.28033395e-01  8.25763720e-01  1.57769954e-01]
 [ 7.63339716e-01  3.75533598e-01  7.07113794e-02  4.23201263e-01]
 [ 4.60647793e-01  2.17372697e-01  9.13172658e-01  4.89820295e-01]
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 [ 5.11155858e-02  2.56583193e-01  8.64626168e-01  5.46587600e-01]
 [ 1.53058826e-01  1.93147407e-01  1.03611343e-01 -6.92539435e-03]
 [ 3.03990928e-02  1.14824410e-01  5.74126057e-01  6.76471646e-01]
 [ 7.48115500e-01  5.92332103e-01  7.02083641e-01  5.98637275e-01]
 [ 5.22491148e-01  8.65734275e-01  1.71862827e-01  7.62079814e-03]
 [ 2.30796052e-01  9.56630662e-01  1.24832503e-01  8.37726967e-01]
 [ 5.09179796e-01  6.77120108e-01  3.35357374e-01  9.65422146e-01]
 [ 7.31914014e-01  1.96182074e-01  3.88981040e-01  5.52774016e-02]
 [ 2.20293511e-01  2.39397735e-01  5.44231053e-01  5.12063789e-01]
 [ 9.03739514e-01  2.22152671e-01  5.55251828e-02  4.62259515e-01]
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 [ 2.28309007e-01  7.14757491e-01  3.04803081e-01  1.42843194e-01]
 [ 8.09090535e-01  2.20075895e-02 -9.44869312e-03  2.12455737e-01]
 [-2.27499525e-02  7.81489791e-02  4.29086242e-01  2.94798594e-02]
 [ 7.73040054e-01  2.94410615e-01  2.61165168e-01  8.45325611e-01]
 [ 8.17634237e-01  7.36699159e-02  3.38355807e-01  4.16352320e-01]
 [ 1.23769036e-01  6.87892819e-01  3.76528807e-01  8.19848733e-01]
 [ 7.55932909e-01  7.28119711e-01  3.14337490e-01  6.45935608e-01]
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 [ 4.04450974e-01  9.56499362e-01  3.26854749e-01  5.07577544e-03]
 [ 3.16050129e-01  3.14372980e-01  8.38174932e-01  3.10168904e-02]
 [ 8.09537140e-01  7.11722740e-01  2.50554466e-01  8.83672119e-01]
 [ 6.69250817e-01  2.13610129e-01  5.47617722e-02  1.83626590e-01]
 [ 3.88465349e-01  2.04705845e-01  2.57887240e-01  7.36506162e-01]
 [-5.86068265e-03  4.60907324e-04  6.18169275e-01  6.20135415e-01]
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 [ 6.78825631e-01  3.56167909e-01  4.18224525e-01  8.25980106e-01]
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 [ 4.83011001e-01  9.72871106e-02  1.86573361e-01  3.20945382e-01]]
[[0.4598208  0.75772146 0.20498962 0.54673344]]
[[0.57872663 0.79617286 0.81597954 0.76935452 0.85376043 0.964829
  0.70077654 0.10965692 0.17204405 1.02433072]
 [0.62631501 0.93195649 0.42557393 0.29119345 0.42874236 0.86719602
  0.56447781 0.63803874 0.78083033 0.29937616]
 [0.19199348 0.33259601 0.68648016 0.94125667 0.91185885 0.76990981
  0.75642252 0.70523349 0.69437499 0.06244709]
 [0.67748535 0.21511893 1.02290669 0.90246388 0.76588013 0.38210184
  0.11262476 0.60551205 0.55230954 0.3776168 ]]
[[0.77270634 0.68245241 0.01801786 0.8175484  0.7182768  0.53680092
  0.38459931 0.59656214 0.8724467  0.54938366]]
your updated weights are:
[[ 6.72045483e-01  2.17108775e-01  9.21914162e-01  8.63197457e-01]
 [ 2.99791926e-01  5.37869333e-01  2.46604519e-01  5.62931126e-01]
 [-4.83795813e-03  5.33408673e-01  9.42721570e-01  5.58306563e-01]
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 [ 8.21271869e-01  1.33068226e-01  8.26018733e-01  6.20494425e-02]
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 [ 9.03739514e-01  2.22152671e-01  5.55251828e-02  4.62259515e-01]
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  0.75642252 0.70523349 0.69437499 0.06244709]
 [0.67748535 0.21511893 1.02290669 0.90246388 0.76588013 0.38210184
  0.11262476 0.60551205 0.55230954 0.3776168 ]]
[[0.77270634 0.68245241 0.01801786 0.8175484  0.7182768  0.53680092
  0.38459931 0.59656214 0.8724467  0.54938366]]
our sample gra_w, gra_w0, gra_v, gra_v0 are:
[ 6 -2  8 -7]
gt updated weights are:
[[-5.45998417e-03  6.36982338e-01  6.52406363e-01  6.43524442e-02]
 [ 3.49280718e-01  5.45730608e-01  2.43301886e-01  6.88116016e-02]
```

```
[ 8.62066922e-02  7.98244088e-01  8.97251269e-01  8.66069915e-01]
[ 7.52338271e-01  8.10609266e-01  3.93152752e-01  1.92404079e-01]
[ 1.86621218e-01  3.20233405e-01  5.09644161e-01  1.37118340e-01]
[-1.02458731e-02  7.33860123e-01  8.00599543e-01  4.89062411e-01]
[ 3.43969647e-01  7.63243229e-02  7.72981583e-01  8.06332531e-01]
[-1.04434061e-02  5.17701463e-01  1.58444027e-01  7.48015489e-01]
[ 9.03209983e-01  8.52723425e-01  6.52715457e-01  7.77813083e-01]
[ 8.54114842e-01  8.12479153e-01  2.89827191e-01  1.82603426e-01]
[ 8.13368700e-01  2.35353642e-02  2.72696334e-02  8.18421108e-02]
[ 2.33593463e-01  5.60032666e-02  3.89011558e-01  7.82582550e-01]
[ 8.66522290e-01  1.12699247e-01  5.84364431e-01  6.37261490e-01]
[ 8.71736363e-01  1.54003122e-03  7.87858001e-01  1.29541231e-01]
[ 5.33964565e-01  1.63491175e-02  8.00682575e-01  7.96938033e-01]
[ 7.68339908e-01  1.48615835e-01  6.24895374e-02  5.88936795e-01]
[ 9.67023343e-01  6.59506343e-01  7.64502259e-01  1.33870771e-01]
[ 2.76169071e-01  8.99133010e-01  6.42722710e-01  6.46528207e-01]
[ 7.16345048e-01  9.24101831e-01  2.55130190e-01  5.72388907e-02]
[ 2.11456122e-01  7.41207377e-01  4.14274788e-01  3.86202983e-02]
[ 4.16445266e-01  1.53760145e-01  7.29931086e-01  7.48335902e-01]
[ 2.03978739e-01  7.25607857e-01  9.36295013e-01  6.17997652e-01]
[ 7.35836362e-01  1.81595508e-01  4.01891047e-01  9.43349082e-01]
[ 7.17046612e-01  7.20068369e-01  8.58514298e-01  2.11726188e-01]
[ 2.29247770e-01  4.84284336e-01  6.46910250e-01  8.48694530e-01]
[ 8.37321520e-01  6.76033240e-01  9.35714886e-01  8.35658692e-01]
[ 6.93469849e-01  5.29309250e-02  6.29931858e-01  3.55674125e-01]
[ 1.50872136e-01  6.62303265e-02  5.92299312e-01  3.79066587e-01]
[ 1.63108575e-01  3.53747060e-01  5.10153104e-02 -9.43391911e-05]
[ 8.96888082e-01  3.92719528e-01  3.95044583e-01  9.51032673e-01]
[ 8.47043443e-01  2.32878209e-01  5.49190568e-01  5.58839486e-01]
[ 2.97032334e-01  1.62579354e-01  3.14280908e-01  2.57796796e-02]
[ 4.39884877e-01  4.70953897e-01  3.85789247e-01  6.33040834e-01]
[ 6.74882710e-01  8.78388577e-01  3.61834360e-01  3.89422535e-02]
[ 7.63982060e-01  4.85906880e-01  8.62890945e-01  6.10503360e-01]
[ 3.78062251e-01  9.60296640e-01  4.32300427e-01  1.99850958e-01]
[ 6.07305543e-01  6.85001290e-01  7.17986222e-01  5.06839746e-01]
[ 7.83446479e-01  4.98308842e-01  5.64323529e-01  1.17635632e-01]
[ 1.94207056e-01  4.17020310e-01  6.17740471e-01  1.24231710e-01]
[ 2.24550257e-01  6.89297920e-01  4.91585361e-01  1.08631282e-01]
[ 5.24666440e-01  7.36271065e-01  3.64362127e-01  4.50100786e-02]
[ 2.16198704e-01  7.39921569e-01  8.04530416e-01  8.45242340e-01]
[ 1.27359741e-01  5.44029028e-02  6.57010090e-01  2.99538275e-01]
[ 9.38681987e-01  5.51635934e-01  2.16685870e-01  2.44446221e-01]
[ 2.13825855e-01  7.54155234e-01  7.12304032e-01  6.13998756e-01]
[ 5.36362361e-01  5.69267985e-01  1.93293786e-01  6.01850154e-01]
[ 6.04136516e-01 -2.90195233e-02  2.71042094e-01  5.45335007e-01]
[ 2.12292645e-01  6.74719607e-01  3.76843364e-01  1.27423735e-02]
[-2.47237277e-02  5.93142960e-01  4.83466637e-01  1.11921487e-01]
[ 8.70364218e-01  1.34083308e-01  8.91106853e-01  7.73305922e-02]
[ 5.64801231e-01  2.65652338e-01  2.50848157e-02  4.59126319e-01]
[ 8.88670591e-01  9.86357339e-02  5.97182674e-01  2.39530878e-01]
[ 2.10590739e-01  4.98982020e-01  7.93893102e-01  7.18798610e-01]
[ 1.42121216e-01  6.18188096e-01  4.75875833e-01  2.12194734e-03]
```

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 [ 7.40468078e-01  4.07402524e-01  1.64619525e-01  8.57183367e-01]
 [ 5.50395849e-01  1.11968571e-01  7.40203267e-01  1.43107859e-01]
 [ 6.52156274e-01  8.60504580e-01  5.61125326e-01  3.60379337e-01]
 [ 4.75720644e-01  5.70075180e-02  4.11019897e-01  8.89535789e-01]
 [ 2.58890553e-01  5.91158498e-01  7.59895813e-01  5.58871517e-01]
 [ 7.66258015e-01  4.60695140e-01  1.41434254e-01  1.06865835e-01]
 [ 8.03907017e-01  7.40802085e-01  5.58830566e-01  8.31943730e-01]
 [ 4.17756964e-01  1.30864736e-02  3.97486643e-02  7.64264401e-01]
 [ 6.79862976e-01  3.30778786e-01  5.95097169e-01  7.58416308e-01]
 [ 3.71591702e-01 -1.85359494e-02  2.15993540e-01  5.44849214e-01]]
[[0.46721959 0.08043698 0.72058117 0.66298098]]
[[ 7.98969989e-01  1.59737476e-02  1.22797233e-01  4.24862307e-02
   1.55495730e-01  5.84272417e-01  5.78831571e-01  4.85101132e-01
   6.78701704e-01  2.88170641e-01]
 [ 7.42813736e-01  5.91060914e-02  3.75540809e-01  9.55485524e-02
   6.20877780e-01  4.99288176e-01  9.59952321e-01  6.82538685e-02
   8.42520606e-01  4.35172301e-01]
 [ 3.80718987e-01  3.23200085e-01  4.31495670e-01  2.50392670e-01
   8.72355868e-01  1.61423295e-01  6.41990250e-01  3.26154152e-05
   2.29493261e-01  3.22021389e-01]
 [ 1.29160577e-01  2.03369994e-03  9.04388313e-02  4.15129523e-01
   9.67026812e-02  8.52680876e-01  6.38610854e-01  6.66171144e-02
  -1.58434141e-02  2.37470017e-01]]
[[0.51580813 0.96174181 0.8136004  0.86176489 0.40242028 0.11204822
  0.72874663 1.00530489 0.54063464 0.64779166]]
your updated weights are:
[[-5.45998417e-03  6.36982338e-01  6.52406363e-01  6.43524442e-02]
 [ 3.49280718e-01  5.45730608e-01  2.43301886e-01  6.88116016e-02]
 [ 8.62066922e-02  7.98244088e-01  8.97251269e-01  8.66069915e-01]
 [ 7.52338271e-01  8.10609266e-01  3.93152752e-01  1.92404079e-01]
 [ 1.86621218e-01  3.20233405e-01  5.09644161e-01  1.37118340e-01]
 [-1.02458731e-02  7.33860123e-01  8.00599543e-01  4.89062411e-01]
 [ 3.43969647e-01  7.63243229e-02  7.72981583e-01  8.06332531e-01]
 [-1.04434061e-02  5.17701463e-01  1.58444027e-01  7.48015489e-01]
 [ 9.03209983e-01  8.52723425e-01  6.52715457e-01  7.77813083e-01]
 [ 8.54114842e-01  8.12479153e-01  2.89827191e-01  1.82603426e-01]
 [ 8.13368700e-01  2.35353642e-02  2.72696334e-02  8.18421108e-02]
 [ 2.33593463e-01  5.60032666e-02  3.89011558e-01  7.82582550e-01]
 [ 8.66522290e-01  1.12699247e-01  5.84364431e-01  6.37261490e-01]
 [ 8.71736363e-01  1.54003122e-03  7.87858001e-01  1.29541231e-01]
 [ 5.33964565e-01  1.63491175e-02  8.00682575e-01  7.96938033e-01]
 [ 7.68339908e-01  1.48615835e-01  6.24895374e-02  5.88936795e-01]
 [ 9.67023343e-01  6.59506343e-01  7.64502259e-01  1.33870771e-01]
 [ 2.76169071e-01  8.99133010e-01  6.42722710e-01  6.46528207e-01]
 [ 7.16345048e-01  9.24101831e-01  2.55130190e-01  5.72388907e-02]
 [ 2.11456122e-01  7.41207377e-01  4.14274788e-01  3.86202983e-02]
 [ 4.16445266e-01  1.53760145e-01  7.29931086e-01  7.48335902e-01]
 [ 2.03978739e-01  7.25607857e-01  9.36295013e-01  6.17997652e-01]
 [ 7.35836362e-01  1.81595508e-01  4.01891047e-01  9.43349082e-01]
 [ 7.17046612e-01  7.20068369e-01  8.58514298e-01  2.11726188e-01]
 [ 2.29247770e-01  4.84284336e-01  6.46910250e-01  8.48694530e-01]
 [ 8.37321520e-01  6.76033240e-01  9.35714886e-01  8.35658692e-01]
```

```
 [ 6.93469849e-01  5.29309250e-02  6.29931858e-01  3.55674125e-01]
 [ 1.50872136e-01  6.62303265e-02  5.92299312e-01  3.79066587e-01]
 [ 1.63108575e-01  3.53747060e-01  5.10153104e-02 -9.43391911e-05]
 [ 8.96888082e-01  3.92719528e-01  3.95044583e-01  9.51032673e-01]
 [ 8.47043443e-01  2.32878209e-01  5.49190568e-01  5.58839486e-01]
 [ 2.97032334e-01  1.62579354e-01  3.14280908e-01  2.57796796e-02]
 [ 4.39884877e-01  4.70953897e-01  3.85789247e-01  6.33040834e-01]
 [ 6.74882710e-01  8.78388577e-01  3.61834360e-01  3.89422535e-02]
 [ 7.63982060e-01  4.85906880e-01  8.62890945e-01  6.10503360e-01]
 [ 3.78062251e-01  9.60296640e-01  4.32300427e-01  1.99850958e-01]
 [ 6.07305543e-01  6.85001290e-01  7.17986222e-01  5.06839746e-01]
 [ 7.83446479e-01  4.98308842e-01  5.64323529e-01  1.17635632e-01]
 [ 1.94207056e-01  4.17020310e-01  6.17740471e-01  1.24231710e-01]
 [ 2.24550257e-01  6.89297920e-01  4.91585361e-01  1.08631282e-01]
 [ 5.24666440e-01  7.36271065e-01  3.64362127e-01  4.50100786e-02]
 [ 2.16198704e-01  7.39921569e-01  8.04530416e-01  8.45242340e-01]
 [ 1.27359741e-01  5.44029028e-02  6.57010090e-01  2.99538275e-01]
 [ 9.38681987e-01  5.51635934e-01  2.16685870e-01  2.44446221e-01]
 [ 2.13825855e-01  7.54155234e-01  7.12304032e-01  6.13998756e-01]
 [ 5.36362361e-01  5.69267985e-01  1.93293786e-01  6.01850154e-01]
 [ 6.04136516e-01 -2.90195233e-02  2.71042094e-01  5.45335007e-01]
 [ 2.12292645e-01  6.74719607e-01  3.76843364e-01  1.27423735e-02]
 [-2.47237277e-02  5.93142960e-01  4.83466637e-01  1.11921487e-01]
 [ 8.70364218e-01  1.34083308e-01  8.91106853e-01  7.73305922e-02]
 [ 5.64801231e-01  2.65652338e-01  2.50848157e-02  4.59126319e-01]
 [ 8.88670591e-01  9.86357339e-02  5.97182674e-01  2.39530878e-01]
 [ 2.10590739e-01  4.98982020e-01  7.93893102e-01  7.18798610e-01]
 [ 1.42121216e-01  6.18188096e-01  4.75875833e-01  2.12194734e-03]
 [ 7.40468078e-01  4.07402524e-01  1.64619525e-01  8.57183367e-01]
 [ 5.50395849e-01  1.11968571e-01  7.40203267e-01  1.43107859e-01]
 [ 6.52156274e-01  8.60504580e-01  5.61125326e-01  3.60379337e-01]
 [ 4.75720644e-01  5.70075180e-02  4.11019897e-01  8.89535789e-01]
 [ 2.58890553e-01  5.91158498e-01  7.59895813e-01  5.58871517e-01]
 [ 7.66258015e-01  4.60695140e-01  1.41434254e-01  1.06865835e-01]
 [ 8.03907017e-01  7.40802085e-01  5.58830566e-01  8.31943730e-01]
 [ 4.17756964e-01  1.30864736e-02  3.97486643e-02  7.64264401e-01]
 [ 6.79862976e-01  3.30778786e-01  5.95097169e-01  7.58416308e-01]
 [ 3.71591702e-01 -1.85359494e-02  2.15993540e-01  5.44849214e-01]]
[[0.46721959 0.08043698 0.72058117 0.66298098]]
[[ 7.98969989e-01  1.59737476e-02  1.22797233e-01  4.24862307e-02
   1.55495730e-01  5.84272417e-01  5.78831571e-01  4.85101132e-01
   6.78701704e-01  2.88170641e-01]
 [ 7.42813736e-01  5.91060914e-02  3.75540809e-01  9.55485524e-02
   6.20877780e-01  4.99288176e-01  9.59952321e-01  6.82538685e-02
   8.42520606e-01  4.35172301e-01]
 [ 3.80718987e-01  3.23200085e-01  4.31495670e-01  2.50392670e-01
   8.72355868e-01  1.61423295e-01  6.41990250e-01  3.26154152e-05
   2.29493261e-01  3.22021389e-01]
 [ 1.29160577e-01  2.03369994e-03  9.04388313e-02  4.15129523e-01
   9.67026812e-02  8.52680876e-01  6.38610854e-01  6.66171144e-02
  -1.58434141e-02  2.37470017e-01]]
[[0.51580813 0.96174181 0.8136004  0.86176489 0.40242028 0.11204822
```

```
  0.72874663 1.00530489 0.54063464 0.64779166]]
our sample gra_w, gra_w0, gra_v, gra_v0 are:
[-9 -8 -3  6]
gt updated weights are:
[[0.43249025 0.54138685 0.62712474 0.12458303]
 [0.23664128 0.93428757 0.62840109 0.31075065]
 [0.61224469 0.72542394 0.79683534 0.62787727]
 [0.04950026 0.89016549 1.02101217 0.28938495]
 [0.27677059 0.91942138 0.59573525 1.00185075]
 [0.51482125 0.1622415  0.6119422  0.31359213]
 [0.78823402 0.97584503 0.93547386 0.29432191]
 [0.29770103 1.04383166 0.77545167 0.40035047]
 [0.47868902 0.51482545 0.62905438 0.89333253]
 [0.97505279 0.98279883 0.47248603 0.10314077]
 [0.10419421 0.46561299 0.80710243 0.45704859]
 [0.14544317 0.79091562 0.24531529 0.69698741]
 [0.71854229 0.11524459 0.63059735 0.79782556]
 [0.64642514 0.68849263 0.21459197 0.85559551]
 [0.72524866 0.34182806 0.34876407 0.7237168 ]
 [0.55855293 0.95367028 1.03352772 0.05178814]
 [0.12109448 0.380019   0.05298466 0.33380267]
 [0.57083975 0.54057332 0.04825697 0.33228488]
 [0.29901341 0.67036024 0.78319739 0.73332199]
 [0.69476399 0.16810339 0.93456132 0.30978801]
 [0.18824896 0.70412281 0.35969085 0.20813015]
 [0.51242965 0.52125896 0.72848322 1.01409549]
 [0.84815247 0.66669526 0.40823957 0.66188084]
 [0.25490623 0.17828072 0.7491584  0.08936899]
 [0.3550417  0.44770417 0.58967615 0.26857466]
 [0.76212795 0.76579234 0.73399093 0.29911062]
 [0.71233454 0.63527557 0.13568984 0.64335144]
 [0.06095027 0.4188336  0.30698484 0.43785638]
 [0.31166845 0.67581731 0.47399175 0.94411346]
 [0.78667172 0.39275025 0.83112438 0.70668765]
 [0.56009738 0.16330194 0.29868425 0.05730731]
 [0.95289122 0.80753112 0.8060716  0.25888147]
 [0.99394322 0.78994622 0.36706652 0.63726263]
 [0.44091462 0.19124887 0.11731048 0.90115152]
 [0.89682539 0.94155337 0.72959483 0.41688857]
 [0.74050507 0.11318991 0.15789964 0.30450452]
 [0.72467266 0.4143424  0.81829029 0.62990284]
 [0.49313473 0.35776772 1.01336317 0.63602839]
 [0.9950873  0.75694422 0.22196671 0.79517559]
 [0.45209377 0.48366373 0.86413252 0.08968456]
 [0.80559304 0.32075039 0.61047586 0.52405941]
 [0.58972038 0.71521213 0.64233502 0.05000507]
 [0.95854047 0.94484734 0.11838807 0.7042451 ]
 [0.75851824 0.17934118 0.95771114 0.64587719]
 [0.78631013 0.47232652 0.13433817 0.0776569 ]
 [0.55120066 0.69771949 0.43833307 0.57661149]
 [0.67824115 0.86481548 0.73306826 0.67018157]
 [1.04377871 0.88392572 0.85449575 0.53241674]
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 [0.59335553 0.67910854 1.01994184 1.00005131]
 [0.58134654 0.79353609 0.72036999 0.97880241]
 [0.07866677 0.75958806 0.90923882 1.03184916]
 [0.05472198 0.06333114 0.48967437 0.19284722]
 [0.33321097 0.2528454  0.65066224 0.69492531]
 [0.6011055  0.15983994 0.33613871 0.98932678]
 [0.19043547 0.06434322 0.5445461  0.08007081]
 [0.05054767 0.18939083 0.7691706  0.0479531 ]
 [0.24387982 1.03433699 1.01760993 0.29608955]
 [0.57893339 0.27965637 0.34664711 0.75008021]
 [0.83535644 0.94199123 0.57119842 0.78300376]
 [0.85102326 0.29984557 0.16078814 0.64108798]
 [1.02162868 0.42290465 0.5938596  0.66447265]
 [0.92603283 0.10540499 0.77079852 0.11583377]
 [0.98324815 0.96676833 0.35645999 0.06516956]
 [0.10568841 0.50516966 0.600475   0.30249071]]
[[0.90555063 0.39211342 0.52812092 0.90811598]]
[[0.70333703 0.73934594 0.18617094 0.52624681 0.29563577 0.92891816
  0.12745559 0.3451621  0.2621467  0.84248515]
 [0.35204895 0.49559464 0.92497186 0.92092091 0.33242571 0.15573259
  0.93860578 0.57668286 0.2663921  0.97143683]
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[[0.32109537 0.2239854  0.35764876 0.4301992  0.24002896 0.76507567
  0.05260774 0.69945964 0.84248381 0.86825797]]
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 [0.61224469 0.72542394 0.79683534 0.62787727]
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 [0.71854229 0.11524459 0.63059735 0.79782556]
 [0.64642514 0.68849263 0.21459197 0.85559551]
 [0.72524866 0.34182806 0.34876407 0.7237168 ]
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 [0.57083975 0.54057332 0.04825697 0.33228488]
 [0.29901341 0.67036024 0.78319739 0.73332199]
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 [0.25490623 0.17828072 0.7491584  0.08936899]
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  0.93860578 0.57668286 0.2663921  0.97143683]
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 [0.15944257 0.56160617 0.1726897  0.42962728 0.82478344 0.11209947
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[[0.32109537 0.2239854  0.35764876 0.4301992  0.24002896 0.76507567
  0.05260774 0.69945964 0.84248381 0.86825797]]
our sample gra_w, gra_w0, gra_v, gra_v0 are:
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 [7.18832880e-01 6.90028193e-01 1.14979623e-01 5.36660523e-01]
 [5.19406169e-01 2.37975196e-01 2.54315884e-01 2.97692587e-01]
 [3.82206846e-01 5.44803656e-01 5.87929613e-01 9.39890255e-01]
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 [5.08224289e-01 -1.38894711e-02 7.43505496e-01 1.66425253e-01]
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 [5.39280436e-01 7.35292404e-01 7.64000354e-01 6.70656849e-01]
 [4.95737435e-01 6.00528322e-01 7.49579901e-01 5.19704430e-01]
 [3.07896733e-01 7.34152584e-01 7.05149736e-01 7.19805198e-01]
 [1.76812646e-01 6.29173246e-01 3.86826155e-01 5.71063722e-01]
 [4.91643939e-01 8.94895862e-01 5.48415681e-01 3.49907760e-01]
 [6.86823795e-01 2.02270428e-01 5.17188589e-01 5.69979733e-01]
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 [9.10154727e-01 4.66285764e-01 4.27710317e-01 7.98118098e-01]
 [5.03756851e-01 3.39997158e-01 7.66281462e-01 5.79577553e-01]
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 [ 7.23933207e-01  7.47130945e-02  9.11612458e-01  6.00557239e-01]]
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[[0.8329985  0.03724461 0.15431042 0.929695   0.17211861 0.20681767
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 [0.6737549  0.70091143 0.956272   0.99595242 0.86249955 0.95864765
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 [0.24633855 0.1599664  0.53634375 0.84433681 0.76428497 0.33676267
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 [0.0838947  0.31645934 0.56188602 0.16848229 0.87698363 0.98911535
  0.36713105 0.76794166 0.60400705 0.51191775]]
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your updated weights are:
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 [-5.36653355e-03  2.59114355e-01  2.66449389e-01  8.11251957e-02]
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 [0.6737549  0.70091143 0.956272   0.99595242 0.86249955 0.95864765
  0.35487724 0.50575779 0.81686549 0.83387612]
 [0.24633855 0.1599664  0.53634375 0.84433681 0.76428497 0.33676267
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 [0.0838947  0.31645934 0.56188602 0.16848229 0.87698363 0.98911535
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[[0.45808767 0.74804362 0.17456122 1.0044387  0.17568722 0.54733657
  0.59395955 0.42017112 0.31080966 0.89557753]]
our sample gra_w, gra_w0, gra_v, gra_v0 are:
[-4  5  4  9]
gt updated weights are:
```

```
[[0.37640349 0.41951861 0.89816976 0.1391239 ]
 [0.64636271 0.99756219 0.55876786 0.46923163]
 [0.31303961 0.45877301 0.49562833 0.38407943]
 [0.36226736 0.82405752 0.72854996 0.94327616]
 [0.0862038  0.9018507  0.19421918 0.67467648]
 [0.60333056 0.25569467 0.61829469 0.56022899]
 [0.47684972 0.76269397 1.01052288 0.9830228 ]
 [0.56862372 0.25555828 0.92999922 0.93520271]
 [0.82919091 0.77436618 0.18019637 0.82634735]
 [0.76968833 0.46915348 0.7735058  0.48075846]
 [0.97386253 0.25967088 0.21918114 0.4509034 ]
 [0.3649575  0.98946524 0.5680111  0.90419111]
 [0.62142817 0.41745346 0.97415038 0.76062166]
 [0.48252399 0.52849135 0.93822602 0.81369687]
 [0.21911159 0.96267999 0.44846649 0.04082278]
 [0.83903945 0.22658316 0.65771731 0.5983967 ]
 [0.26162186 0.65114462 0.66881439 0.04595445]
 [0.67620027 0.27389679 0.56799185 0.16997273]
 [0.32784793 0.14795933 0.818512   0.24920019]
 [0.10402549 1.01438385 0.48553342 0.9314538 ]
 [0.78536682 0.08268259 0.55085083 0.29703653]
 [0.15185173 0.30696199 0.22146093 0.53195646]
 [0.14064342 0.97373779 0.58580417 0.04690558]
 [0.62552941 0.72375069 0.97777887 0.03356699]
 [0.54930817 0.46393699 0.43131352 0.5426089 ]
 [0.909669   0.5570114  0.11172491 0.2683737 ]
 [0.27781176 0.63164568 0.89448564 0.52932332]
 [0.86325559 0.61319559 0.21680742 0.75087156]
 [0.9038771  0.93041276 0.98375642 0.40340448]
 [0.60558685 0.68880026 0.8570735  0.62644476]
 [0.22710906 0.79824246 0.07390523 0.53250702]
 [0.62134189 0.45040379 0.46247557 0.07674067]
 [0.336471   0.26741338 0.13951024 0.27523694]
 [0.29249772 0.07703662 0.42330801 0.72122105]
 [0.78409372 0.60695851 0.79311183 0.18871683]
 [0.24421165 0.48238567 0.32398696 0.7910386 ]
 [0.22967067 0.76634348 0.95046674 0.90246695]
 [0.47710889 0.26790964 0.23070627 0.73309635]
 [0.94294727 0.90840415 1.01947646 0.20214214]
 [0.02666842 0.8163317  1.01522468 0.62257306]
 [0.63504114 0.83262062 0.34485288 0.09708503]
 [0.7433711  0.03806772 0.64754182 0.13181556]
 [0.06445547 0.69860612 0.69373738 0.25122027]
 [0.60219796 0.24979455 0.66439254 0.41717297]
 [0.22741372 0.76415698 0.3699733  0.58155359]
 [0.660555   0.63783216 0.14638945 0.35372644]
 [0.22774863 0.09254701 0.50980033 0.4618441 ]
 [0.31094113 0.63449939 0.76515098 0.22123345]
 [0.42472738 0.53802946 0.95736739 0.3450204 ]
 [0.33438358 0.12753698 0.75477515 0.14757052]
 [0.81145722 0.88920899 0.84778091 0.0801213 ]
 [0.51146892 0.06610848 0.99570932 0.5927208 ]
```

```
 [0.98912519 0.24353    0.7769374  0.32715277]
 [0.66134065 0.93547356 0.53746501 0.6884192 ]
 [0.71066879 0.90630153 0.57340591 0.73332017]
 [0.77868556 0.80020704 0.4439343  0.59783364]
 [0.26974299 0.46848533 0.71640571 0.62996868]
 [0.27169776 0.52981201 0.2409421  0.4893269 ]
 [0.3428237  0.13319169 0.76924578 0.61877914]
 [0.4273393  0.95565235 0.50180639 1.01104488]
 [0.41807371 0.31370008 0.79488599 0.94148836]
 [0.80204107 0.67847917 0.55051679 0.29737616]
 [0.76895477 0.38975874 0.06686254 0.737903  ]
 [0.69870873 0.75282205 0.29609805 0.90661948]]
[[0.37568068 0.28129892 0.23461795 0.79067189]]
[[ 0.92109794  0.24305111  0.82068917  0.66972323  0.6688391   0.46929534
   0.0024671   0.5088927   0.84915128  0.05769724]
 [-0.01530143  0.91119591  0.73336857  0.81798013  0.95596426  0.02359331
   0.55392753  0.41585243  0.57684267  0.70649731]
 [ 0.67985612  0.82053229  0.06131421  0.95746385  0.67546318  0.36853799
   0.51371714  0.74047184  0.19197799  0.27109116]
 [ 0.04898466  0.59490094  0.82984407  0.22624802  0.25364103  0.61856431
   0.45253099  0.44887339  0.33307168  0.71593994]]
[[0.05738094 0.23119311 0.11963132 0.81646284 0.4437606  0.34147924
  0.85929629 0.61392378 0.0443626  0.09138723]]
your updated weights are:
[[0.37640349 0.41951861 0.89816976 0.1391239 ]
 [0.64636271 0.99756219 0.55876786 0.46923163]
 [0.31303961 0.45877301 0.49562833 0.38407943]
 [0.36226736 0.82405752 0.72854996 0.94327616]
 [0.0862038  0.9018507  0.19421918 0.67467648]
 [0.60333056 0.25569467 0.61829469 0.56022899]
 [0.47684972 0.76269397 1.01052288 0.9830228 ]
 [0.56862372 0.25555828 0.92999922 0.93520271]
 [0.82919091 0.77436618 0.18019637 0.82634735]
 [0.76968833 0.46915348 0.7735058  0.48075846]
 [0.97386253 0.25967088 0.21918114 0.4509034 ]
 [0.3649575  0.98946524 0.5680111  0.90419111]
 [0.62142817 0.41745346 0.97415038 0.76062166]
 [0.48252399 0.52849135 0.93822602 0.81369687]
 [0.21911159 0.96267999 0.44846649 0.04082278]
 [0.83903945 0.22658316 0.65771731 0.5983967 ]
 [0.26162186 0.65114462 0.66881439 0.04595445]
 [0.67620027 0.27389679 0.56799185 0.16997273]
 [0.32784793 0.14795933 0.818512   0.24920019]
 [0.10402549 1.01438385 0.48553342 0.9314538 ]
 [0.78536682 0.08268259 0.55085083 0.29703653]
 [0.15185173 0.30696199 0.22146093 0.53195646]
 [0.14064342 0.97373779 0.58580417 0.04690558]
 [0.62552941 0.72375069 0.97777887 0.03356699]
 [0.54930817 0.46393699 0.43131352 0.5426089 ]
 [0.909669   0.5570114  0.11172491 0.2683737 ]
 [0.27781176 0.63164568 0.89448564 0.52932332]
 [0.86325559 0.61319559 0.21680742 0.75087156]
```

```
 [0.9038771  0.93041276 0.98375642 0.40340448]
 [0.60558685 0.68880026 0.8570735  0.62644476]
 [0.22710906 0.79824246 0.07390523 0.53250702]
 [0.62134189 0.45040379 0.46247557 0.07674067]
 [0.336471   0.26741338 0.13951024 0.27523694]
 [0.29249772 0.07703662 0.42330801 0.72122105]
 [0.78409372 0.60695851 0.79311183 0.18871683]
 [0.24421165 0.48238567 0.32398696 0.7910386 ]
 [0.22967067 0.76634348 0.95046674 0.90246695]
 [0.47710889 0.26790964 0.23070627 0.73309635]
 [0.94294727 0.90840415 1.01947646 0.20214214]
 [0.02666842 0.8163317  1.01522468 0.62257306]
 [0.63504114 0.83262062 0.34485288 0.09708503]
 [0.7433711  0.03806772 0.64754182 0.13181556]
 [0.06445547 0.69860612 0.69373738 0.25122027]
 [0.60219796 0.24979455 0.66439254 0.41717297]
 [0.22741372 0.76415698 0.3699733  0.58155359]
 [0.660555   0.63783216 0.14638945 0.35372644]
 [0.22774863 0.09254701 0.50980033 0.4618441 ]
 [0.31094113 0.63449939 0.76515098 0.22123345]
 [0.42472738 0.53802946 0.95736739 0.3450204 ]
 [0.33438358 0.12753698 0.75477515 0.14757052]
 [0.81145722 0.88920899 0.84778091 0.0801213 ]
 [0.51146892 0.06610848 0.99570932 0.5927208 ]
 [0.98912519 0.24353    0.7769374  0.32715277]
 [0.66134065 0.93547356 0.53746501 0.6884192 ]
 [0.71066879 0.90630153 0.57340591 0.73332017]
 [0.77868556 0.80020704 0.4439343  0.59783364]
 [0.26974299 0.46848533 0.71640571 0.62996868]
 [0.27169776 0.52981201 0.2409421  0.4893269 ]
 [0.3428237  0.13319169 0.76924578 0.61877914]
 [0.4273393  0.95565235 0.50180639 1.01104488]
 [0.41807371 0.31370008 0.79488599 0.94148836]
 [0.80204107 0.67847917 0.55051679 0.29737616]
 [0.76895477 0.38975874 0.06686254 0.737903  ]
 [0.69870873 0.75282205 0.29609805 0.90661948]]
[[0.37568068 0.28129892 0.23461795 0.79067189]]
[[ 0.92109794  0.24305111  0.82068917  0.66972323  0.6688391   0.46929534
   0.0024671   0.5088927   0.84915128  0.05769724]
 [-0.01530143  0.91119591  0.73336857  0.81798013  0.95596426  0.02359331
   0.55392753  0.41585243  0.57684267  0.70649731]
 [ 0.67985612  0.82053229  0.06131421  0.95746385  0.67546318  0.36853799
   0.51371714  0.74047184  0.19197799  0.27109116]
 [ 0.04898466  0.59490094  0.82984407  0.22624802  0.25364103  0.61856431
   0.45253099  0.44887339  0.33307168  0.71593994]]
[[0.05738094 0.23119311 0.11963132 0.81646284 0.4437606  0.34147924
  0.85929629 0.61392378 0.0443626  0.09138723]]
our sample gra_w, gra_w0, gra_v, gra_v0 are:
[-9 -5 -5  6]
gt updated weights are:
[[0.38731925 0.76382931 0.30681597 0.30265305]
 [0.315082   0.65853724 0.72561171 0.81584907]
```

```
[0.68878731 0.93148015 0.68998377 0.17401643]
[0.36688984 0.3004422  0.41186493 0.98782773]
[0.50741556 0.07941905 0.04825111 0.76705722]
[0.54923295 0.12709347 0.99903474 0.3930831 ]
[0.87175517 0.9079746  0.57838019 0.66053635]
[0.14747214 0.06847005 0.11231943 0.62359324]
[0.54057123 0.75325735 0.09890358 0.32964355]
[0.65796549 0.3243656  0.95308234 0.51619443]
[0.0867474  0.2066793  0.29668933 0.40427685]
[0.6168681  0.10701641 0.90966686 0.40958468]
[0.1873821  0.932778   0.16082281 0.21680056]
[0.49833218 0.79799249 0.914359   0.10609103]
[0.05401076 0.39700952 0.81625095 0.31127736]
[1.02945121 0.92502084 0.32287262 0.1232084 ]
[0.15230497 0.26371835 0.08211979 0.1947902 ]
[0.99663247 1.03690739 0.12114814 1.00814184]
[0.45276467 0.17897958 0.97810016 0.91331851]
[0.58833228 0.47801447 0.16680776 0.86802245]
[0.3656709  0.17767823 0.57789109 0.68203372]
[0.16645649 0.30627888 0.34390747 0.91244879]
[0.99636292 0.88919106 0.77426389 0.18229985]
[0.79335242 1.01132076 0.93440262 1.02955213]
[0.9774148  0.3269435  0.2558222  0.08805905]
[0.41945963 1.00235844 0.82777389 0.13453716]
[0.7985504  0.97714068 0.31014018 0.75827435]
[0.80451544 0.39129664 0.06622127 0.5267242 ]
[0.71432064 0.57433505 0.48194339 0.69761439]
[0.33485013 0.33079809 0.9335037  0.87703383]
[0.19858107 0.52264863 0.83105667 0.55577567]
[0.59295567 0.54212039 0.23703308 0.86732399]
[0.58326142 0.52574697 0.68149558 0.75373882]
[0.12040075 0.82387781 0.63571935 0.87741977]
[0.67089242 0.89211219 1.03720761 0.86591494]
[0.21547746 0.98464466 1.01053993 0.92578966]
[0.09069407 1.04086584 0.58114411 0.2092049 ]
[0.50258165 0.32650529 0.2996131  0.10469817]
[0.5848858  0.19388357 0.66426402 0.46196562]
[0.7721251  0.38784023 0.41827044 0.68808891]
[0.82592905 0.36731175 0.29471375 0.51190556]
[0.48509055 0.6009518  0.31621075 0.71422068]
[0.29692265 0.30969241 0.82164865 0.2868173 ]
[0.51277411 0.58903494 1.04279623 0.10811849]
[0.56471629 0.6981144  0.60002341 0.56509814]
[0.8468168  0.39698233 0.38382404 0.42558735]
[0.43888415 0.35403774 0.57240657 0.8567705 ]
[0.6441982  0.81888439 0.88881019 0.98134308]
[0.67493276 0.74287859 0.83773103 0.9505447 ]
[0.86668796 0.30555    0.41570153 0.38712576]
[0.93921181 0.58785546 0.38997153 0.09252632]
[0.37360126 0.97589736 0.3120849  0.50300469]
[0.32438406 0.60110499 0.0766409  0.85856896]
[0.65243426 0.79827018 0.47236358 0.3166597 ]
```

```
 [0.51359357 0.58456488 0.44288763 0.71002255]
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 [0.97738161 0.22962606 0.42815527 0.65286389]
 [0.04947009 0.87888503 0.80790041 0.98237189]
 [0.05168526 0.52867232 0.62070605 0.35090508]
 [0.69026618 0.83382347 0.45589277 0.21416462]
 [0.04818571 0.21642044 0.21840002 0.30711099]
 [0.39224171 0.36961301 0.25902296 1.02062481]
 [0.63867095 0.48635997 0.61909721 0.22961109]]
[[0.34425188 0.79491106 0.23605334 0.47078241]]
[[0.19835198 0.16708106 0.22081742 0.91470912 0.64848474 0.16727656
  0.3193856  0.68094354 0.5610444  0.04991295]
 [0.71498812 0.85957959 0.76986189 0.41174186 0.08066976 0.93916848
  0.07314145 0.15838789 0.81680593 0.08638854]
 [0.81625685 0.46925991 0.96890342 0.66058274 0.46418782 0.10880184
  0.46390426 0.73302421 0.05220079 0.50976831]
 [0.03534501 0.83707604 0.37529696 0.2793695  0.27877114 0.85207828
  0.33295751 0.23667996 0.63476429 0.41184437]]
[[0.61974279 0.25936375 0.93799709 0.5852031  0.33264411 0.56050651
  0.28275343 0.84146777 0.01729287 0.4167775 ]]
your updated weights are:
[[0.38731925 0.76382931 0.30681597 0.30265305]
 [0.315082   0.65853724 0.72561171 0.81584907]
 [0.68878731 0.93148015 0.68998377 0.17401643]
 [0.36688984 0.3004422  0.41186493 0.98782773]
 [0.50741556 0.07941905 0.04825111 0.76705722]
 [0.54923295 0.12709347 0.99903474 0.3930831 ]
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 [0.15230497 0.26371835 0.08211979 0.1947902 ]
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 [0.79335242 1.01132076 0.93440262 1.02955213]
 [0.9774148  0.3269435  0.2558222  0.08805905]
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 [0.12040075 0.82387781 0.63571935 0.87741977]
 [0.67089242 0.89211219 1.03720761 0.86591494]
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 [0.09069407 1.04086584 0.58114411 0.2092049 ]
 [0.50258165 0.32650529 0.2996131  0.10469817]
 [0.5848858  0.19388357 0.66426402 0.46196562]
 [0.7721251  0.38784023 0.41827044 0.68808891]
 [0.82592905 0.36731175 0.29471375 0.51190556]
 [0.48509055 0.6009518  0.31621075 0.71422068]
 [0.29692265 0.30969241 0.82164865 0.2868173 ]
 [0.51277411 0.58903494 1.04279623 0.10811849]
 [0.56471629 0.6981144  0.60002341 0.56509814]
 [0.8468168  0.39698233 0.38382404 0.42558735]
 [0.43888415 0.35403774 0.57240657 0.8567705 ]
 [0.6441982  0.81888439 0.88881019 0.98134308]
 [0.67493276 0.74287859 0.83773103 0.9505447 ]
 [0.86668796 0.30555    0.41570153 0.38712576]
 [0.93921181 0.58785546 0.38997153 0.09252632]
 [0.37360126 0.97589736 0.3120849  0.50300469]
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 [0.39224171 0.36961301 0.25902296 1.02062481]
 [0.63867095 0.48635997 0.61909721 0.22961109]]
[[0.34425188 0.79491106 0.23605334 0.47078241]]
[[0.19835198 0.16708106 0.22081742 0.91470912 0.64848474 0.16727656
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 [0.71498812 0.85957959 0.76986189 0.41174186 0.08066976 0.93916848
  0.07314145 0.15838789 0.81680593 0.08638854]
 [0.81625685 0.46925991 0.96890342 0.66058274 0.46418782 0.10880184
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 [0.03534501 0.83707604 0.37529696 0.2793695  0.27877114 0.85207828
  0.33295751 0.23667996 0.63476429 0.41184437]]
[[0.61974279 0.25936375 0.93799709 0.5852031  0.33264411 0.56050651
  0.28275343 0.84146777 0.01729287 0.4167775 ]]
our sample gra_w, gra_w0, gra_v, gra_v0 are:
[0 3 4 5]
gt updated weights are:
[[0.68429064 0.58242765 0.97182033 0.33754663]
 [0.49094824 0.25169224 0.11094886 0.21191451]
 [0.75363704 0.46905537 0.80234326 0.98409556]
 [0.09468778 0.59196979 0.38046491 0.89747783]
```

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[0.78891817 0.10181757 0.93454362 0.51855313]
[0.38994723 0.83767245 0.18784945 0.04692589]
[0.8354836  0.12840614 0.44706564 0.41791695]
[0.99241679 0.07818638 0.49799326 0.65686004]
[0.50328987 0.05737904 0.89756338 0.25344777]
[0.95569214 0.61731516 0.60765749 0.68706762]
[0.72264369 0.17514203 0.19112632 0.43076326]
[0.22880101 0.70748024 0.43099252 0.18543462]
[0.52794931 0.62663898 0.48228567 0.44642381]
[0.27892004 0.38421108 0.20667577 0.65445576]
[0.96142799 0.38522019 0.51184466 0.62642139]
[0.04928097 0.65867833 0.16808349 0.37354796]
[0.84981826 0.61833679 0.88823743 0.94198113]
[0.56946022 0.34739867 0.26894946 0.02395742]
[0.54410528 0.14217819 0.69800487 0.7770345 ]
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[0.3798469  0.62251562 0.23742415 0.63463484]
[0.05598208 0.87969674 0.22319259 0.95788265]
[0.24933306 0.80761081 0.52952551 0.21071934]
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[0.84608355 0.10008939 0.1855488  0.40492893]
[0.8263342  0.11180716 0.1160272  0.74373488]
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[0.84994029 0.98568839 0.47148319 0.39010283]
[0.88674216 0.4245339  0.39342784 0.86505791]
[0.95647752 0.57683852 0.86406826 0.81410671]
[0.9752349  0.31860666 0.86632955 0.01003045]
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[0.73946593 0.08244208 0.35403    0.14051231]
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[0.45128816 0.89900224 0.6676616  0.54372337]
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[0.86191471 0.53828008 0.6999506  0.42790129]
[0.92617909 0.01626903 0.87985545 0.61151618]
[0.9039315  0.92135917 0.42517771 0.80500297]
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[0.54123923 0.40451001 0.04820577 0.14802434]
[0.83079945 0.02093143 0.12999379 0.66224304]
[0.73883283 0.92944433 0.4513276  0.60771285]
[0.89783173 0.40932851 0.4927075  0.15541512]
[0.28960416 0.80320124 0.74682322 0.10566572]
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[0.51962058 0.3352665  0.06806177 0.94612501]
```

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 [0.78912192 0.52453628 0.46744472 0.7147753 ]
 [0.26248166 0.99032094 0.86352833 0.6049772 ]
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 [0.00935827 0.21670756 0.50058107 0.03947412]
 [0.76352519 0.59282464 0.41694353 0.83720473]
 [0.80563749 0.87451331 0.74603122 0.97173702]
 [0.17167027 0.81238405 0.94035481 0.14766704]
 [0.60992351 0.83256242 0.10992355 0.18617796]]
[[0.06100245 0.98490623 0.46981661 0.58677273]]
[[ 0.46467341  0.49461593 -0.01678019  0.66776816  0.22406643  0.9366824
   0.57235896  0.35746032  0.41716159  0.38257358]
 [ 0.17779813  0.42993966  0.07352348  0.66570548  0.46095693  0.76380963
   0.45629899  0.56366759  0.06972425  0.82246573]
 [ 0.56216749  0.32652768  0.00405996  0.95534575  0.28454424  0.8439396
   0.06515482  0.3530783   0.66143445  0.7341447 ]
 [ 0.33835669  0.93301925  0.54349101  0.73787995  0.81653623  0.54131582
   0.13722692  0.86275416  0.58723438 -0.00636929]]
[[0.86498142 0.36490684 0.66965601 0.84638014 0.58130814 0.38774693
  0.43087549 0.57826197 0.20406739 0.05954833]]
your updated weights are:
[[0.68429064 0.58242765 0.97182033 0.33754663]
 [0.49094824 0.25169224 0.11094886 0.21191451]
 [0.75363704 0.46905537 0.80234326 0.98409556]
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 [0.78891817 0.10181757 0.93454362 0.51855313]
 [0.38994723 0.83767245 0.18784945 0.04692589]
 [0.8354836  0.12840614 0.44706564 0.41791695]
 [0.99241679 0.07818638 0.49799326 0.65686004]
 [0.50328987 0.05737904 0.89756338 0.25344777]
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 [0.72264369 0.17514203 0.19112632 0.43076326]
 [0.22880101 0.70748024 0.43099252 0.18543462]
 [0.52794931 0.62663898 0.48228567 0.44642381]
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 [0.96142799 0.38522019 0.51184466 0.62642139]
 [0.04928097 0.65867833 0.16808349 0.37354796]
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 [0.56946022 0.34739867 0.26894946 0.02395742]
 [0.54410528 0.14217819 0.69800487 0.7770345 ]
 [0.61770877 0.07395268 0.50689399 0.58735441]
 [0.70593588 0.28431227 0.95367626 0.44055188]
 [0.3798469  0.62251562 0.23742415 0.63463484]
 [0.05598208 0.87969674 0.22319259 0.95788265]
 [0.24933306 0.80761081 0.52952551 0.21071934]
 [0.88778071 0.16914014 0.17166458 0.62006423]
 [0.79420352 0.0034907  0.45892752 0.38060312]
 [0.84608355 0.10008939 0.1855488  0.40492893]
 [0.8263342  0.11180716 0.1160272  0.74373488]
 [0.4587528  0.5494744  0.03932679 0.32953062]
 [0.84994029 0.98568839 0.47148319 0.39010283]
 [0.88674216 0.4245339  0.39342784 0.86505791]
 [0.95647752 0.57683852 0.86406826 0.81410671]
```

```
 [0.9752349  0.31860666 0.86632955 0.01003045]
 [0.27752464 0.0571501  0.89043427 0.17438634]
 [0.6461576  0.68112653 0.94382612 0.23890908]
 [0.73946593 0.08244208 0.35403    0.14051231]
 [0.54400274 0.84528188 0.07652408 0.11417431]
 [0.07105034 0.88857002 0.76041092 0.55647384]
 [0.52655722 0.93438181 0.43632846 0.67434204]
 [0.7697855  0.57723427 0.16777852 0.24474488]
 [0.57437865 0.20768219 0.37681191 0.73323151]
 [0.45128816 0.89900224 0.6676616  0.54372337]
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 [0.07510753 0.29125471 0.18943984 0.14989765]
 [0.86191471 0.53828008 0.6999506  0.42790129]
 [0.92617909 0.01626903 0.87985545 0.61151618]
 [0.9039315  0.92135917 0.42517771 0.80500297]
 [0.60243222 0.53932927 0.07194164 0.15392767]
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 [0.54123923 0.40451001 0.04820577 0.14802434]
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 [0.73883283 0.92944433 0.4513276  0.60771285]
 [0.89783173 0.40932851 0.4927075  0.15541512]
 [0.28960416 0.80320124 0.74682322 0.10566572]
 [0.33551345 0.83338852 0.52088157 0.36403928]
 [0.51962058 0.3352665  0.06806177 0.94612501]
 [0.78912192 0.52453628 0.46744472 0.7147753 ]
 [0.26248166 0.99032094 0.86352833 0.6049772 ]
 [0.14582445 0.72655878 0.88383149 0.94684455]
 [0.00935827 0.21670756 0.50058107 0.03947412]
 [0.76352519 0.59282464 0.41694353 0.83720473]
 [0.80563749 0.87451331 0.74603122 0.97173702]
 [0.17167027 0.81238405 0.94035481 0.14766704]
 [0.60992351 0.83256242 0.10992355 0.18617796]]
[[0.06100245 0.98490623 0.46981661 0.58677273]]
[[ 0.46467341  0.49461593 -0.01678019  0.66776816  0.22406643  0.9366824
   0.57235896  0.35746032  0.41716159  0.38257358]
 [ 0.17779813  0.42993966  0.07352348  0.66570548  0.46095693  0.76380963
   0.45629899  0.56366759  0.06972425  0.82246573]
 [ 0.56216749  0.32652768  0.00405996  0.95534575  0.28454424  0.8439396
   0.06515482  0.3530783   0.66143445  0.7341447 ]
 [ 0.33835669  0.93301925  0.54349101  0.73787995  0.81653623  0.54131582
   0.13722692  0.86275416  0.58723438 -0.00636929]]
[[0.86498142 0.36490684 0.66965601 0.84638014 0.58130814 0.38774693
  0.43087549 0.57826197 0.20406739 0.05954833]]
our sample gra_w, gra_w0, gra_v, gra_v0 are:
[ 6 -4 -6  0]
gt updated weights are:
[[ 0.11607814  0.93623775  0.58067911  0.88212497]
 [ 0.02576977  0.15408007  0.50232725  0.3800306 ]
 [ 0.77130089  0.7604829   0.29707499  0.82648566]
 [ 0.59615354  0.64381196  0.71920531  0.71475814]
 [ 0.87702516  0.83441512  0.60289603  0.54329107]
 [ 0.83054651  0.10918662  0.8810451   0.83697387]
```

```
[ 0.56901252  0.03960278  0.88840842  0.71765373]
[ 0.77269615  0.60412419  0.38861965  0.82379405]
[ 0.32913763  0.85113563 -0.01996545  0.16884199]
[ 0.62564056  0.80634398  0.20800317  0.65223949]
[ 0.32451621  0.00540552  0.462926    0.50889435]
[ 0.63483939  0.04215718  0.38752996  0.70728414]
[ 0.59901771  0.13973803  0.05411427  0.01735431]
[ 0.7978957  -0.0250361   0.43181862  0.8979134 ]
[ 0.96959655  0.24802214  0.80449059  0.30450266]
[ 0.03126516  0.05853514  0.35188013  0.40770381]
[ 0.14571004  0.71785579  0.82850632  0.13201349]
[ 0.02605804  0.10090918  0.13252404  0.01901947]
[ 0.6506871   0.74299978  0.06986691  0.7138648 ]
[ 0.50063366  0.8080143   0.19429561  0.8555103 ]
[ 0.1017585   0.05888833  0.73563457  0.57640016]
[-0.01891146  0.90252245  0.27336272  0.0320131 ]
[ 0.40893466  0.70840258  0.58341902  0.06657707]
[ 0.7531989   0.03809088  0.8537317   0.78944647]
[ 0.88834035  0.46124572  0.43550612  0.51491633]
[ 0.51757645  0.07508313  0.01234167  0.4206727 ]
[ 0.77575711  0.10366257  0.3867678   0.14072409]
[ 0.81742715  0.23002919  0.58472574  0.0571737 ]
[ 0.41313983  0.82567567  0.48964032  0.31526351]
[ 0.56277995  0.07634413  0.28713019  0.11810905]
[ 0.7020155   0.90718409  0.05330599  0.67298183]
[ 0.75810267  0.68468633  0.8930772   0.91694239]
[ 0.9024175   0.4371364   0.63414934 -0.02067947]
[ 0.62339148  0.91947015  0.79217444  0.8196507 ]
[ 0.76442608  0.70800669  0.83714031  0.13703002]
[ 0.96963459  0.63372215  0.56807694  0.30017338]
[ 0.56968368  0.9592276   0.04960811  0.1369108 ]
[ 0.89853092  0.87333676  0.2761396   0.41982168]
[ 0.70355125  0.35840236  0.04181202  0.24567193]
[ 0.16299552  0.30120213  0.61487516  0.68320565]
[ 0.07639667  0.37756204  0.26858692  0.51255365]
[ 0.00258347  0.5737578  -0.02090367  0.04887243]
[ 0.05244496  0.07981167  0.65288745  0.45725644]
[ 0.29939262  0.42272945  0.47337618  0.51901112]
[ 0.52848141  0.50636874  0.76015274  0.61652929]
[ 0.9483062   0.89393482  0.04229457  0.60744474]
[ 0.02309259  0.52547532  0.57527824  0.78744294]
[ 0.10692024  0.94114767  0.00663054  0.87558955]
[ 0.6577088   0.3649818   0.78528614  0.17786271]
[ 0.9586258   0.55196978  0.92211902  0.42763375]
[ 0.1988937   0.06091034  0.36074867  0.26668128]
[ 0.89376833  0.28794383  0.82393229  0.71724606]
[ 0.75342226  0.14582883  0.77293937  0.70665907]
[ 0.08854308  0.51400056  0.02164255  0.33555466]
[ 0.64577221  0.32377339  0.05045092  0.8568857 ]
[ 0.21354388  0.0123354   0.22620783  0.73895768]
[ 0.63654561  0.54304518  0.15774879  0.83611025]
[ 0.78628121 -0.01488956  0.03351115  0.92977329]
```

```
 [-0.02806308  0.35315132  0.60498877  0.65585062]
 [ 0.38030567  0.1910978   0.84107762  0.37187778]
 [ 0.63771659  0.89677925  0.7176786   0.92961863]
 [ 0.7528148   0.2666145   0.23190343  0.53163046]
 [ 0.95567     0.95828818  0.91618327 -0.01250626]
 [ 0.93572682  0.20458794  0.76871122  0.16209878]]
[[0.46467029 0.99321952 0.27722199 1.01155625]]
[[0.15571072 0.98955396 0.25003819 0.32830579 0.98747899 0.35400156
  0.39453146 0.7425035  0.49617673 0.4153128 ]
 [0.23845971 1.01096851 0.8455446  0.2298377  0.38458394 0.90548985
  0.15776009 0.09008015 0.32196705 0.46701095]
 [0.73038159 0.91078739 0.16460142 0.43567021 0.90105703 0.07829322
  0.87773316 0.74881582 0.2768452  0.83840584]
 [0.66009105 0.18564866 0.11988119 0.96039392 0.77776085 0.81600848
  0.15284938 0.81163283 0.95784707 0.48370812]]
[[0.92241717 0.83597902 0.71727293 0.33460696 0.97572993 0.01319242
  0.19758643 0.00318804 0.54900269 0.81480766]]
your updated weights are:
[[ 0.11607814  0.93623775  0.58067911  0.88212497]
 [ 0.02576977  0.15408007  0.50232725  0.3800306 ]
 [ 0.77130089  0.7604829   0.29707499  0.82648566]
 [ 0.59615354  0.64381196  0.71920531  0.71475814]
 [ 0.87702516  0.83441512  0.60289603  0.54329107]
 [ 0.83054651  0.10918662  0.8810451   0.83697387]
 [ 0.56901252  0.03960278  0.88840842  0.71765373]
 [ 0.77269615  0.60412419  0.38861965  0.82379405]
 [ 0.32913763  0.85113563 -0.01996545  0.16884199]
 [ 0.62564056  0.80634398  0.20800317  0.65223949]
 [ 0.32451621  0.00540552  0.462926    0.50889435]
 [ 0.63483939  0.04215718  0.38752996  0.70728414]
 [ 0.59901771  0.13973803  0.05411427  0.01735431]
 [ 0.7978957  -0.0250361   0.43181862  0.8979134 ]
 [ 0.96959655  0.24802214  0.80449059  0.30450266]
 [ 0.03126516  0.05853514  0.35188013  0.40770381]
 [ 0.14571004  0.71785579  0.82850632  0.13201349]
 [ 0.02605804  0.10090918  0.13252404  0.01901947]
 [ 0.6506871   0.74299978  0.06986691  0.7138648 ]
 [ 0.50063366  0.8080143   0.19429561  0.8555103 ]
 [ 0.1017585   0.05888833  0.73563457  0.57640016]
 [-0.01891146  0.90252245  0.27336272  0.0320131 ]
 [ 0.40893466  0.70840258  0.58341902  0.06657707]
 [ 0.7531989   0.03809088  0.8537317   0.78944647]
 [ 0.88834035  0.46124572  0.43550612  0.51491633]
 [ 0.51757645  0.07508313  0.01234167  0.4206727 ]
 [ 0.77575711  0.10366257  0.3867678   0.14072409]
 [ 0.81742715  0.23002919  0.58472574  0.0571737 ]
 [ 0.41313983  0.82567567  0.48964032  0.31526351]
 [ 0.56277995  0.07634413  0.28713019  0.11810905]
 [ 0.7020155   0.90718409  0.05330599  0.67298183]
 [ 0.75810267  0.68468633  0.8930772   0.91694239]
 [ 0.9024175   0.4371364   0.63414934 -0.02067947]
 [ 0.62339148  0.91947015  0.79217444  0.8196507 ]
```

```
 [ 0.76442608  0.70800669  0.83714031  0.13703002]
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 [ 0.56968368  0.9592276   0.04960811  0.1369108 ]
 [ 0.89853092  0.87333676  0.2761396   0.41982168]
 [ 0.70355125  0.35840236  0.04181202  0.24567193]
 [ 0.16299552  0.30120213  0.61487516  0.68320565]
 [ 0.07639667  0.37756204  0.26858692  0.51255365]
 [ 0.00258347  0.5737578  -0.02090367  0.04887243]
 [ 0.05244496  0.07981167  0.65288745  0.45725644]
 [ 0.29939262  0.42272945  0.47337618  0.51901112]
 [ 0.52848141  0.50636874  0.76015274  0.61652929]
 [ 0.9483062   0.89393482  0.04229457  0.60744474]
 [ 0.02309259  0.52547532  0.57527824  0.78744294]
 [ 0.10692024  0.94114767  0.00663054  0.87558955]
 [ 0.6577088   0.3649818   0.78528614  0.17786271]
 [ 0.9586258   0.55196978  0.92211902  0.42763375]
 [ 0.1988937   0.06091034  0.36074867  0.26668128]
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 [ 0.63654561  0.54304518  0.15774879  0.83611025]
 [ 0.78628121 -0.01488956  0.03351115  0.92977329]
 [-0.02806308  0.35315132  0.60498877  0.65585062]
 [ 0.38030567  0.1910978   0.84107762  0.37187778]
 [ 0.63771659  0.89677925  0.7176786   0.92961863]
 [ 0.7528148   0.2666145   0.23190343  0.53163046]
 [ 0.95567     0.95828818  0.91618327 -0.01250626]
 [ 0.93572682  0.20458794  0.76871122  0.16209878]]
[[0.46467029 0.99321952 0.27722199 1.01155625]]
[[0.15571072 0.98955396 0.25003819 0.32830579 0.98747899 0.35400156
  0.39453146 0.7425035  0.49617673 0.4153128 ]
 [0.23845971 1.01096851 0.8455446  0.2298377  0.38458394 0.90548985
  0.15776009 0.09008015 0.32196705 0.46701095]
 [0.73038159 0.91078739 0.16460142 0.43567021 0.90105703 0.07829322
  0.87773316 0.74881582 0.2768452  0.83840584]
 [0.66009105 0.18564866 0.11988119 0.96039392 0.77776085 0.81600848
  0.15284938 0.81163283 0.95784707 0.48370812]]
[[0.92241717 0.83597902 0.71727293 0.33460696 0.97572993 0.01319242
  0.19758643 0.00318804 0.54900269 0.81480766]]
```

Submitted Files

MyMLP.py

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```python
import numpy as np


# normalize raw data by (x-mean)/(1e-5+std)
def normalize(x, mean=None, std=None):
    if mean is None:
        mean = np.mean(x, axis=0).reshape(1,-1)
        std = np.std(x, axis=0).reshape(1,-1)
    x = (x-mean)/(std+1e-5)
    return x, mean, std


# ------------------- process_label function -----------------------------
# Input: a list of labels, n*1
# Output: one hot encoding of the labels
# For example, if there are 3 class, and the labels for the data are [0,0,1,1,0,2],
# the one hot encoding should be [[1,0,0],[1,0,0],[0,1,0],[0,1,0],[1,0,0],[0,0,1]]
def process_label(label):
    # placeholders
    one_hot = np.zeros([len(label),10])

    for i in range(len(label)):
        one_hot[i,label[i]] = 1

    return one_hot


# ------------------- tanh function -----------------------------
# input: intermediate features (n,d)
# output: results of plugging the value into (e^-x-e^x)/(e^-x+e^x), you can use np.exp()
# the output should have the same shape of the input (n,d)
def tanh(x):
    # implement the hyperbolic tangent activation function for hidden layer
    out = np.zeros_like(x)
    # preprocess x to boost the performance, no need to modify
    x = np.clip(x,a_min=-100,a_max=100)

    # compute the output
    out = (np.exp(x)-np.exp(-x))/(np.exp(x)+np.exp(-x))
    return out


# ------------------- softmax function -----------------------------
# input: intermediate features (n,d)
# output: results of plugging the value into (e^xi)/(sum_i e^xi), you can use np.exp()
# the output should have the same shape of the input (n,d)
# for example, if input is [[1,2],[1,3]], output should be
# [[e^1/(e^1+e^2), e^2/(e^1+e^2)], [e^1/(e^1+e^3), e^1/(e^1+e^3)]]
def softmax(x):
```

```
    # implement the softmax activation function for output layer
    out = np.zeros_like(x)
    out = np.exp(x)/np.exp(x).sum(-1).reshape(-1,1)

    return out


class MLP:
    def __init__(self,num_hid):
        # initialize the weights
        self.num_hid = num_hid
        self.lr = 5e-3 # 5e-3
        self.w = np.random.random([64,num_hid])
        self.w0 = np.random.random([1,num_hid])
        self.v= np.random.random([num_hid,10])
        self.v0 = np.random.random([1,10])

    # This function centers around the training process
    def fit(self,train_x,train_y, valid_x, valid_y):
        # counter for recording the number of epochs without improvement
        count = 0
        best_valid_acc = 0

        """
        Stop the training if there is no improvment over the best validation accuracy for more than 100 iterations
        """
        while count<=50:
            # training with all samples (full-batch gradient descents)
            # implement the forward pass for all samples
            z, y = self.forward(train_x)

            # implement the backward pass (backpropagation)
            # compute the gradients w.r.t. different parameters
            gra_v = self.dEdv(z, y, train_y)
            gra_v0 = self.dEdv0(y, train_y)
            gra_w = self.dEdw(z, y, train_x, train_y)
            gra_w0 = self.dEdw0(z, y, train_y)

            # update the parameters
            self.update(gra_w, gra_w0, gra_v, gra_v0)

            # evaluate on validation data
            predictions = self.predict(valid_x)
            valid_acc = np.count_nonzero(predictions.reshape(-1)==valid_y.reshape(-1))/len(valid_x)

            # compare the current validation accuracy with the best one
            if valid_acc>best_valid_acc:
                best_valid_acc = valid_acc
                count = 0
            else:
                count += 1
```

```
101
102         return best_valid_acc
103
104     # ------------------- forward function -----------------------------
105     # the forward pass map the input x to output y with 2 layers
106     # input: input features x (n,64)
107     # output: z intermediate output (n, num_hid)
108     #         y final output        (n,10)
109     # z = tanh(xw+w0) x:(n,64), w: (64, num_hid), w0: (1, num_hid), z: (n, num_hid)
110     # y = softmax(zv+v0) v:(num_hid, 10), v0: (1, 10), y:(n,10)
111     def forward(self, x):
112         # placeholders
113         z = np.zeros([len(x), self.num_hid])
114         y = np.zeros([len(x), 10])
115
116         z = tanh(x.dot(self.w) + self.w0)
117         y = softmax(z.dot(self.v) + self.v0)
118         return z, y
119
120     # ------------------- Please Implment all of the following functions --------------------
121     # In the following, you are going to implement the most important part - compute update
122     # rules. As we have already learned in the lecture, the update rule is basically the
123     # multiplication of multiple partial derivatives.
124     # Assume
125     # r is the labels (e.g train y)
126     # t = xw+w0 (n, num_hid)
127     # z = tanh(t) (n, num_hid)
128     # o = zv+v0 (n,10)
129     # y = softmax(o) (n, 10)
130     # We can have the derivative for each parameters
131     # gra_v = dE/dy * dy/do * do/dv  (1, num_hid)
132     # gra_v0 = dE/dy * dy/do * do/dv0  (1, 10)
133     # gra_w = dE/dy * dy/do * do/dz * dz/dt * dt/dw  (1, 64)
134     # gra_w0 = dE/dy * dy/do * do/dz * dz/dt * dt/dw0  (1, num_hid)
135
136     # Next we demonstrate a concrete example to help you start with the derivatives to
137     # get these formula
138     # ------------- gra_v ---------------------------------------------------------------
139     # dE/dv = [[dE/dv11, dE/dv12, ..., dE/dv1k],
140     #          [dE/dv21, dE/dv22, ..., dE/dv2k],
141     #           ....
142     #          [dE/dv101, dE/dv102, ..., dE/dv10k]] (10, num_hid) vector
143     # To get each term, we select row j (dE/dvj) to approach, dE/dvj = dE/dy * dy/vj (where vj is (1,
    num_hid))
144     #
145     # dE/dy = [dE/dy1, dE/dy2, .... , dE/dy10] (1, 10)
146     # dy/dv = [[dy1/dv1, dy1/dv2, ..., dy1/dv10],
147     #          [dy2/dv1, dy2/dv2, ..., dy2/dv10],
148     #           ....
149     #          [dy10/dv1, dy10/dv2, ..., dy10/dv10]]  v_j denotes a (1, num_hid) vector
150     #
151     # each term in dE/dv will be: dE/dvj = sum_i dE/dyi * dyi/dvj
```

```
152     # for any term in the dy/dv,
153     # e.g, dyi/dvj = sum_k dyi/dok * dok/dvj = sum_k yi(delta_ik - yk)*(dok/dvj)
154     # since only when k=j dok/dvj != 0, the term is simplified to yi(delta_ij-yj)*z
155     # plugging dyi/dvj into  dE/dvj = sum_i dE/dyi * dyi/dvj = -sum_i ri/yi * yi(1-yj)*z
156     # - sum_i ri/yi * yi(delta_ij-yj)*z = - (sum_i ri*delta_ij*z - sum_i ri*yj*z)
157     # since sum_i yi = 1 (one hot encoding sum up to 1), delta_ij = 0 if i != j
158     # the term is simplified to dE/dvj = -(rj*zj - yj*z) = (yj-rj)*z
159     # as (ri-yi) has shape (1, n), z has shape (n, num_hid), the term should be z.T(yj-rj)
160     # plugging this term back to dE/dv
161     # we have dE/dv = [[z.T(y1-r1)],
162     #                 [z.T(y2-r2)],
163     #                  ...
164     #                 [z.T(y10-r10)]], where zi has shape (n, num_hid),
165     # finally, dE/dv can be formulated as
166     # dE/dv = z.T@(y-r)
167 
168     # Input: z, output of the intermediate layer (n, num_hid)
169     #        y, output of the last layer (n, 10)
170     #        r, gt one-hot labels (n, 10)
171     # Output: gra_v, (num_hid, 10)
172     def dEdv(self, z, y, r):
173         # placeholder
174         out = np.zeros_like(self.v)
175 
176         out = z.T @ ( y-r )
177 
178         return out
179 
180     # the only difference between v and v0 is that you need to replace z with
181     # a (n, 1) vector, whose entries are 1
182     # Input: z, output of the intermediate layer (n, num_hid)
183     #        y, output of the last layer (n, 10)
184     #        r, gt one-hot labels (n, 10)
185     # Output: out, gra_v0, (1, 10)
186     # c = np.ones(n,1)
187     # gra_v0 = c.T@(y-r) or (y-r).sum(axis=0)
188     def dEdv0(self, y, r):
189         # placeholder
190         out = np.zeros_like(self.v0)
191 
192         out = ( y-r ).sum( axis = 0 )
193 
194         return out
195 
196     # The following two derivatives are left for you to derive by yourself, by adding extra terms into
197     # the derivative
198     # hint: take care of the operations between different vectors/matrices, determine whether it
    should
199     # be elementwise(*) or matrix multication(@)
200     # Input: z, output of the intermediate layer (n, num_hid)
201     #        y, output of the last layer (n, 10)
202     #        x, input of first layer (n, 64)
```

```
    #       r, gt one-hot labels (n, 10)
    # Output: out, gra_w, (64, num_hid)
    def dEdw(self, z, y, x, r):
        # placeholder
        out = np.zeros_like(self.w)

        intermediate = ( y-r ) @ self.v.T
        out = ( ( intermediate * ( 1 - z**2 ) ).T @ x ).T

        return out

    # Input: z, output of the intermediate layer (n, num_hid)
    #       y, output of the last layer (n, 10)
    #       r, gt one-hot labels (n, 10)
    # Output: out, gra_w, (1, num_hid)
    def dEdw0(self, z, y, r):
        # placeholder
        out = np.zeros_like(self.w0)

        intermediate = ( y-r ) @ self.v.T
        out = ( intermediate * ( 1 - z**2 ) ).sum( axis = 0 )

        return out

    # Input: gra_w,
    #       gra_w0,
    #       gra_v,
    #       gra_v0, four gradients
    # Output: no return, direcly update the class parameters self.w, self.w0, .....
    # e.g self.w = self.w - self.lr*gra_w
    def update(self, gra_w, gra_w0, gra_v, gra_v0):

        self.v = self.v - self.lr * gra_v
        self.v0 = self.v0 - self.lr * gra_v0

        self.w = self.w - self.lr * gra_w
        self.w0 = self.w0 - self.lr * gra_w0

        return


    # ---------------------- Implement this function -------------------------
    # you may reuse self.forward, but take care of the return values
    # the returned labels should be class index, rather than probability
    def predict(self,x):
        # place holders
        y = np.zeros([x.shape[0]])

        hidden_layer = tanh( np.dot(x, self.w) + self.w0)
        output_layer = softmax( np.dot(hidden_layer, self.v) + self.v0)

        y = output_layer.argmax( axis = 1 )
```

```
255
256         return y
257
258     def get_hidden(self,x):
259         # extract the intermediate features computed at the hidden layers
260         z = tanh(x.dot(self.w) + self.w0)
261         return z
262
```