Problem 1,Part 1

```
For 1th Iteration B :
 [[ 1 -3]
 [ 3  2]]

For 1th Iteration N :
 [[-1  4  4]
 [ 2  1 -1]]

For 1th Iteration r :
 [-5. -7. -8.]

For 2th Iteration B :
 [[ 1 -1]
 [ 3  2]]

For 2th Iteration N :
 [[-3  4  4]
 [ 2  1 -1]]

For 2th Iteration r :
 [-2.09090909  1.          3.63636364]

For 3th Iteration B :
 [[ 4 -1]
 [ 1  2]]

For 3th Iteration N :
 [[-3  1  4]
 [ 2  3 -1]]

For 3th Iteration r :
 [ 4.6 -3.6 -1.8]

Value of X :
 [[0.        ]
 [0.        ]
 [1.66666667]
 [0.66666667]
 [0.        ]]

Cost :
 -2.0
```

Problem 1,Part 2

```
For 1th Iteration B :
 [[2 3]
 [3 1]]

For 1th Iteration N :
 [[-2  1  2]
 [ 0  2 -2]]

For 1th Iteration r :
 [ 3.  5. -1.]

For 2th Iteration B :
 [[ 2  2]
 [ 3 -2]]

For 2th Iteration N :
 [[-2  1  3]
 [ 0  2  1]]

For 2th Iteration r :
 [ 3.28571429  5.71428571 -1.14285714]

Value of X :
 [[0.8]
 [0. ]
 [0. ]
 [0. ]
 [1.2]]

Cost :
 0.8000000000000003
```

Problem 2

We have five constarint equation, and four of them follow inequalities condition, Therefore we need four slack variable, let's call them s_1, s_2, s_3, s_4. Let's define the basic variale as x_1, x_2, x_3 for T,A and P. The LP that need to be solved is:

$$-100x_1 + 0x_2 + 0x_3 + 1s_1 + 0s_2 + 0s_3 + 0s_4 = -5$$

$$-2x_1 - 4.8x_2 - 19.7x_3 + 0s_1 + 1s_2 + 0s_3 + 0s_4 = -5.5$$

$$2x_1 + 4.8x_2 + 19.7x_3 + 0s_1 + 0s_2 + 1s_3 + 0s_4 = 7$$

$$-100x_1 - 125x_2 - 125x_3 + 0s_1 + 0s_2 + 0s_3 + 1s_4 = -5$$

$$x_1 + x_2 + x_3 + 0s_1 + 0s_2 + 0s_3 + 0s_4 = 1$$

where

$$s_1 = -5 - (-100x_1)$$

$$s_2 = -5.5 - (-2x_1 - 4.8x_2 - 19.7x_3)$$

$$s_3 = 7 - (2x_1 + 4.8x_2 + 19.7x_3)$$

$$s_4 = -115 - (-100x_1 - 125x_2 - 125x_3)$$

```
Result for Iteration(Using 0,1,2,3,4 columns as an initial guess):

For 1th Iteration B :
 [[-100.     0.     0.     0.     0. ]
 [  -2.    -4.8  -19.7    0.     1. ]
 [   2.     4.8   19.7    0.     0. ]
 [-100.  -125.  -125.     1.     0. ]
 [   1.     1.     1.     0.     0. ]]

For 1th Iteration N :
 [[0. 1.]
 [0. 0.]
 [1. 0.]
 [0. 0.]
 [0. 0.]]

For 1th Iteration r :
 [-4.50401138e-16 -6.00000000e-01]

For 2th Iteration B :
 [[-100.     0.     0.     0.     0. ]
 [  -2.    -4.8  -19.7    0.     0. ]
 [   2.     4.8   19.7    0.     1. ]
 [-100.  -125.  -125.     1.     0. ]
 [   1.     1.     1.     0.     0. ]]
```

```
For 2th Iteration N :
 [[0. 1.]
 [1. 0.]
 [0. 0.]
 [0. 0.]
 [0. 0.]]

For 2th Iteration r :
 [-5.08541755e-17  1.50000000e-01]

Value of X :
 [[0.05      ]
 [0.89362416]
 [0.05637584]
 [0.        ]
 [0.        ]
 [1.5       ]
 [8.75      ]]

Cost :
 30.75
```

0.05 + 0.89 + 0.056 = 1, i.e T + A + P = 1