HW4

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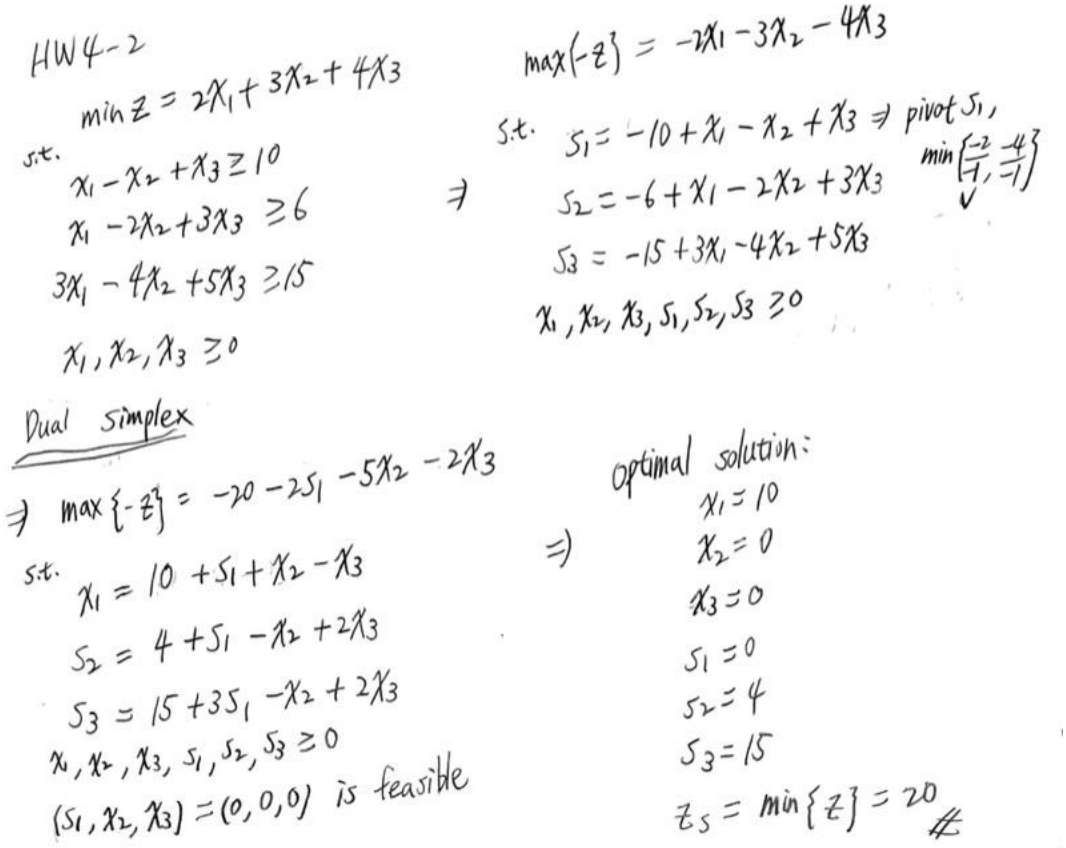
HW4-1

1. What is the optimal solution?
   x1: 3.000000
   x2: 1.500000
   Zs = 21.000000
2. What are the shadow prices and reduced costs?
   reduced costs:
   [0.0, 0.0]
   shadow prices:
   [0.75, 0.5, 0.0, 0.0]

3. What will be the objective function at the optimal state?
   $Z = 21 - 0.75\ s_1 - 0.5\ s_2$

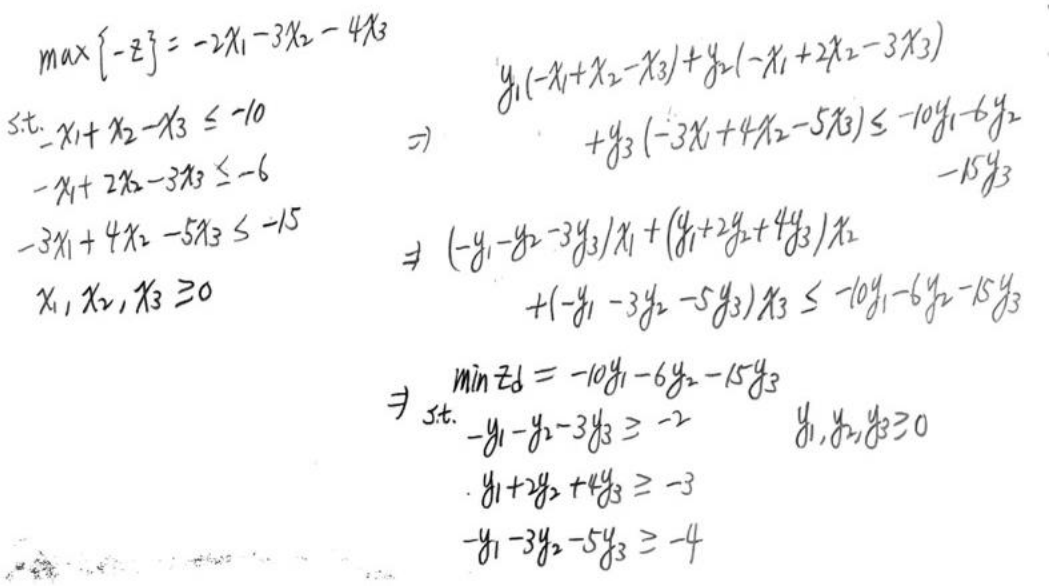
HW4-2



Q: Is it appropriate to use the (Primal) Simplex Method? Can you use the 2-Phase Method?
It's not appropriate to use the (Primal) Simplex Method. If we change min{z} to max{-z}, we will get all $b_i < 0$. To tackle this, we need to use the 2-phase Method.

Q: Would the Dual Simplex Method work?
As the handwritten sheet above, Dual Simplex Method is feasible.

Q: What if you convert the problem into its dual problem?



Q: Can you use the Simplex on the Dual problem?
(see next page)

$$\max\{-z_d\} = 10y_1 + 6y_2 + 15y_3$$

s.t.

$s_1 = 2 - y_1 - y_2 - 3y_3$

$s_2 = 3 + y_1 + 2y_2 + 4y_3$

$s_3 = 4 - y_1 - 3y_2 - 5y_3$

$s_1, s_2, s_3, y_1, y_2, y_3 \geq 0$

∵ all $b_i > 0$

∴ we can use simplex method to solve it

≠

$$\max\{-z_d\} = 20 - 10s_1 - 4y_2 - 15y_3$$

$y_1 = 2 - s_1 - y_2 - 3y_3$

$s_2 = 5 - s_1 + y_2 + y_3$

$s_3 = 2 + s_1 - 2y_2 - 2y_3$

$y_1, y_2, y_3, s_1, s_2, s_3 \geq 0$

∴ $\min z_d = 20$ #