Assignment 5

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1 Problem 3

1.1 Primal

from Sylvester's criterion we get following conditions:

$$(4y_1 + 2) \geq 0,$$
$$-25y_1^2 \geq 0,$$
$$3y_2 \geq 0$$

Second inequality gives us $y_1 = 0$. So, minimization result is 0.

1.2 Dual

Let's write dual problem in a way

$$\min_Z - \langle Z, G \rangle,$$
$$\text{subject to } \langle Z, F_i \rangle = c_i,$$
$$Z \succeq 0$$

$$\min_Z - \langle Z, G \rangle \to \min -2Z_{3,3}$$

$$\langle Z, F_i \rangle = c_i \to$$
$$10Z_{1,2} + 4Z_{3,3} = 2,$$
$$3Z_{2,2} = 0$$

$$Z \succeq 0, Z_{2,2} = 0 \Rightarrow Z_{1,2} = 0 \Rightarrow Z_{3,3} = \frac{1}{2} \Rightarrow$$
$$\Rightarrow \min -2Z_{3,3} = -1$$

This result differs from 0 for primal problem. That proofs that strong duality fails to hold in this problem.