

Optimization in Computer Networks

Parham Alvani

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1 NUM PROBLEM

$$\begin{array}{ll} \max_x & \sum_{i=1}^3 x_i \\ \text{s.t.} & \\ & x_1 \leq 20 \\ & x_1 + x_2 \leq 30 \\ & x_2 \leq 20 \\ & x_2 + x_3 \leq 30 \\ & x_3 \leq 25 \\ & x_2 \leq \log(x_1) \end{array} \tag{1.1}$$

1.1 STANDARD FORM

$$\begin{aligned}
& \min_x && - \sum_{i=1}^3 x_i \\
& \text{s.t.} && \\
& && x_1 - 20 \leq 0 \\
& && x_1 + x_2 - 30 \leq 0 \\
& && x_2 - 20 \leq 0 \\
& && x_2 + x_3 - 30 \leq 0 \\
& && x_3 - 25 \leq 0 \\
& && x_2 - \log(x_1) \leq 0
\end{aligned} \tag{1.2}$$

1.1.1 BARRIERS

$$\begin{aligned}
& \min_x && - \sum_{i=1}^3 x_i \\
& && - \mu \frac{1}{x_1 - 20} \\
& && - \mu \frac{1}{x_1 + x_2 - 30} \\
& && - \mu \frac{1}{x_2 - 20} \\
& && - \mu \frac{1}{x_2 + x_3 - 30} \\
& && - \mu \frac{1}{x_3 - 25} \\
& && - \mu \frac{1}{x_2 - \log(x_1)}
\end{aligned} \tag{1.3}$$