29.3-5, 29.3-6,33.4-1

29.3-5

Solve the following linear program using SIMPLEX:

$$\begin{array}{llcl} \text{maximize} & 18x_1 + 12.5x_2 & & \\ \text{subject to} & & & \\ & x_1 + x_2 & \leq & 20 \\ & x_1 & \leq & 12 \\ & x_2 & \leq & 16 \\ & x_1, x_2 & \geq & 0 . \end{array}$$

$z = 18x_1 + 12.5x_2$ ①

$x_3 = 20 - x_1 - x_2$ ②

$x_4 = 12 - x_1$ ③

$x_5 = 16 - x_2$ ④

⑤ ③ ⟹ $x_1 = 12 - x_4$

⑥ ④ ⟹ $x_2 = 16 - x_5$

⑦ = (⑤ ⟹ ②) $x_3 = 20 - (12 - x_4) - x_2$

$x_3 = 8 + x_4 - x_2$

⑧ $z = 18(12 - x_4) + 12.5x_2$

$z = 216 - 18x_4 + 12.5x_2$

⑨ $z = 216 + 12.5x_2 - 18x_4$

⑩ $x_1 = 12 \quad - x_4$

⑪ $x_3 = 8 - x_2 + x_4$

⑫ $x_5 = 12 - x_2$

⑪ ⟹ ⑨

New ① $z = 316 + x_3 - 17x_4$

② $x_2 = 8 - x_3 + x_4$

③ $x_5 = 8 + x_3 - x_4$

④ $x_1 = 12 \quad - x_4$

set $x_1 = 12 \quad x_4 = 0$

$x_2 = 8 \quad x_3 = 0$

$x_5 = 8$

$z = 18x_1 + 12.5x_2$

$= 18 \cdot 12 + 12.5 \cdot 8$

$= 216 + 100$

$= 316$

29.3-6

Solve the following linear program using SIMPLEX:

$$
\begin{array}{llcll}
\text{maximize} & 5x_1 & - & 3x_2 & \\
\text{subject to} & & & & \\
& x_1 & - & x_2 & \le 1 \\
& 2x_1 & + & x_2 & \le 2 \\
& x_1, x_2 & & & \ge 0 .
\end{array}
$$

① $z = 5x_1 - 3x_2$ $z = 5$

② $x_3 = 1 - x_1 - x_2$

③ $x_4 = 2 - 2x_1 - x_2$

④ $x_1 = 1 - x_2 - x_3$

④−③ ⑤ $x_4 = x_2 + 2x_3$

$5(1 - x_2 - x_3) - 3x_2$

$5 - 5 - 5 \quad -3x_2$

⑥ $z = 5 - 8x_2 - 5x_3$

$z = 5 - 8x_2 - 5x_3$

$x_1 = 1 - x_2 - x_3 = 0$

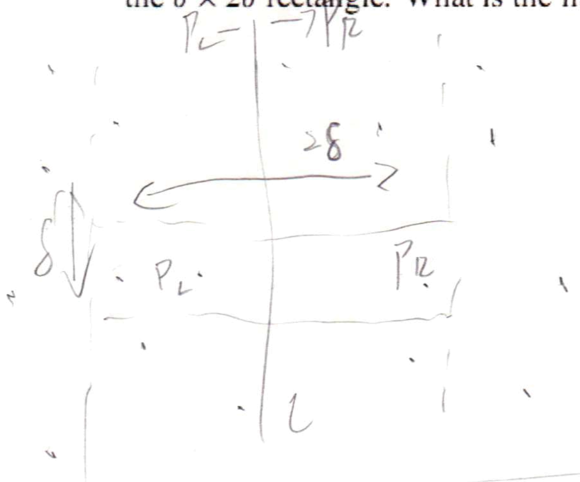
$x_4 = x_2 + 2x_3$ $x_4 = 0$, $x_2 = 0$, $x_1 = 1$

$x_1 = 1 \quad x_2 = 0$

$x_3 = 0 \quad x_4 = 0$

33.4-1

Professor Williams comes up with a scheme that allows the closest-pair algorithm to check only 5 points following each point in array Y'. The idea is always to place points on line l into set P_L. Then, there cannot be pairs of coincident points on line l with one point in P_L and one in P_R. Thus, at most 6 points can reside in the $\delta \times 2\delta$ rectangle. What is the flaw in the professor's scheme?



the shortest $\delta = \min(\delta_L, \delta_R)$
In this case most 8 points can reside in the $\delta \times 2\delta$. For each p, min 7 points need to check for shortest distance.

Williams change to 5 points need to check. The max is 6 points in $\delta \times 2\delta$.

Set one point on the line for both region. then total number is 6.

In this case, there are 8 points in that rectangle and ~~earlier~~ two pairs on the line l, but now the line l makes count 6 in case of comparison because min distance formula gives the length in horizontal way, not in the vertical way. So one point has to be compared with 5 other points.

So if only 5 points reside in the array Y' and it sales number of points that are checked every time reduce from 7 to 5. This approach does exactly what closest pair finding approach with 7 points is suppose to do with less number of comparison in each ...