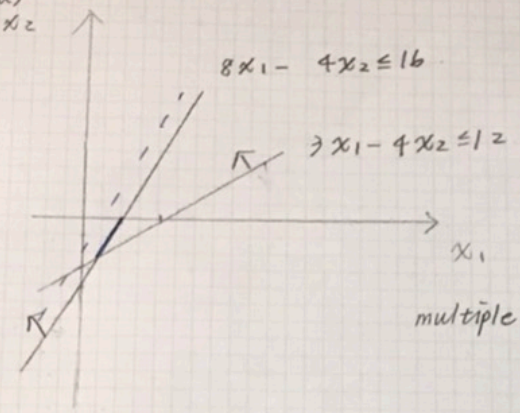
7. (a)




multiple optimal solution

(b) The constraint $8x_1 - 4x_2 \le 16$ and $x_1 \ge 0$ are binding at $(x_1, x_2) = (2, 0)$

(c) There is no binding constraints.

(d) $8x_1 - 4x_2 \le 16$ is binding at any optimal solution.
$x_1 \ge 0$ and $x_2 \le 0$ is binding at $(x_1, x_2) = (2, 0)$
$7x_1 - 4x_2 \le 12$ is binding at $(x_1, x_2) = (\frac{4}{5}, -\frac{12}{5})$

9. $y_1$ = Kaohsiung refinery.
$y_2$ = Taipei refinery.

| | |
|---|---|
| $x_{11}$ | $x_{12}$ |
| $x_{21}$ | $x_{22}$ |

$$\max \quad 16{,}000x_{11} + 19{,}000x_{12} + 22{,}000x_{21} + 18{,}000x_{22} - 140{,}000y_1 - 180{,}000y_2$$

s.t.
$$x_{11} + x_{21} \le 6$$
$$x_{12} + x_{22} \le 6$$
$$x_{11} + x_{12} \le 7 + y_1$$
$$x_{21} + x_{22} \le 4 + y_2$$
$$x_{ij} \ge 0 \quad \forall i = 1, 2,\ j = 1, 2.$$

9. everyday production amount $x_{it}$, ending inventory $y_{it}$

$$\sum_{i=1}^{N} \sum_{t=1}^{T} C_{it} x_{it} + \sum_{i=1}^{N} H_i \sum_{t=1}^{T} y_{it}$$

s.t. $y_{i,0} = 0 \quad \forall i = 1 \cdots N$

$$y_{i,t-1} + x_{it} - D_{it} = y_{it} \quad \forall i = 1, \cdots N,\ t = 1 \cdots T$$

$$\sum_{i=1}^{N} x_i \le k \quad \forall t = 1, \cdots, T$$

$$x_{it} \ge 0,\ y_{it} \ge 0 \quad \forall i = 1 \cdots N,\ t = 1 \cdots T$$