Q1)

Vilde Oppegård

set B = set of boxes
W = set of wagons

parameter

wei_b = weight of box b $\quad b \in B$

cap_w = capacity of wagon w, $\quad w \in W$

decision variable:

$$X_{b,w} = \begin{cases} 1 & \text{if } b \text{ is assigned to wagon } w \\ 0 & \text{otherwise} \end{cases}$$

$$y_w = \begin{cases} 1 & \text{if wagon } w \text{ is used} \\ 0 & \text{otherwise} \end{cases}$$

$$\min \sum_{w \in W} y_w$$

constraint:

$$X_{1,2} + X_{2,2} \leq 1$$

$$X_{2,4} < 1$$

$$X_{2,i} + X_{3,i} \geq 2 \quad i \in W$$

$$\sum_{b=1}^{3} w_b X_{w,b} \leq cap_w \quad w \in W$$

$$X_{b,w} \in \{0,1\}, \quad y_w \in \{0,1\}$$

Q2 Vilde Oppegård.

set: N = set of nodes

variable:

X_{ij} = amount of barrels of oil pumped from node i to nod j. $(i,j) \in N$.

$$\max \quad Z = X_{S2} + X_{S1}$$

Constraint:

$$X_{S2} + X_{12} = X_{2E}$$
$$X_{S1} = X_{12} + X_{13}$$
$$X_{13} = X_{3E}$$

$$0 \leq X_{S1} \leq 2$$
$$0 \leq X_{S2} \leq 3$$
$$0 \leq X_{12} \leq 3$$
$$0 \leq X_{13} \leq 4$$
$$0 \leq X_{3E} \leq 1$$
$$0 \leq X_{2E} \leq 2$$