

Question 1

$$C = [1, \dots, 4]$$

$$T = [1, \dots, 5]$$

$\forall i \in C$  &  $\forall j \in T$  define  $X_{ij} = \begin{cases} 1 & \text{car } i \text{ assigned by Truck } j \\ 0 & \text{a.w.} \end{cases}$

$\forall j \in T$  define  $C_j = \text{cost}$

define  $K_j = \text{capacity}$

$$\text{Min } 0.5 \sum_{i \in C} \sum_{j \in T} C_j X_{ij}$$

$$\text{s.t. } \forall j \in T$$

$$\sum_{i \in C} X_{ij} \leq K_j$$

$$\forall i \in C$$

$$\sum_{j \in T} X_{ij} = 1$$

Question 2

$$A = [1, \dots, 6]$$

$$Y = [1, \dots, 5]$$

$\forall i \in A$  &  $\forall j \in Y$  define  $X_{ij} = \begin{cases} 1 & \text{asset } i \text{ sold in year } j \\ 0 & \text{o.w.} \end{cases}$

define  $C_{ij} = \text{spend}$

$$\text{Max } \sum_{i \in A} \sum_{j \in Y} C_{ij} X_{ij}$$

$$\text{s.t. } \forall j \in Y \\ \sum_{i \in A} C_{ij} X_{ij} \geq 30$$

$$\forall i \in A \\ \sum_{j \in Y} X_{ij} = 1$$

Question 2

$$R = \{1, \dots, 6\}$$

$$\forall i \in R \quad \text{defined} \quad X_i = \begin{cases} 1 & \text{if ambulance locate in } i \\ 0 & \text{o.w.} \end{cases}$$
$$Y_i = \begin{cases} 1 & \text{if region } i \text{ served within 4 min} \\ 0 & \text{o.w.} \end{cases}$$

$P_i$  = population

$$\forall i \in R \quad \forall j \in R \quad T_{ij} = \text{time between } i \text{ \& } j$$
$$C_{ij} = \begin{cases} 1 & T_{ij} \leq 4 \\ 0 & \text{o.w.} \end{cases}$$

$$\text{Max } \sum_{i \in R} P_i Y_i$$

$$\text{s.t. } \sum_{i \in R} X_i = 2$$

$$\forall i \in R$$

$$\sum_{j \in R} C_{ij} X_j \geq Y_i$$

$$\text{D. Min } \sum_{i \in R} X_i$$

$$\text{s.t. } \forall i \in R$$

$$\sum_{j \in R} C_{ij} X_j \geq Y_i$$

$$\sum P_i Y_i = \sum P_i$$