Lesson 9: Exercises

9.1 For the bi-objective unidimensional 01 knapsack problem,

$$\max \left\{ (p^1 x,\ p^2 x) \mid wx \leq c,\ x \in \{0,1\}^n \right\}$$

with

- $n = 5$
- $p^1 = (\ 6,\ 4,\ 4,\ 4,\ 3)$
- $p^2 = (\ 12,\ 10,\ 5,\ 3,\ 1)$
- $w = (\ 8,\ 6,\ 4,\ 3,\ 2)$
- $c = 15$

1) compute Y_N , the set of non-dominated points.

2) plot Y_N

Entrée [ ]:

9.2 Consider the following bi-objective generalized assignment (2-GAP) problem:

$$\left(\max \sum_{i=1}^{m} \sum_{j=1}^{n} p_{ij}^1 x_{ij} \ ,\ \max \sum_{i=1}^{m} \sum_{j=1}^{n} p_{ij}^2 x_{ij} \right)$$

$$s.t \quad \sum_{j=1}^{n} w_{ij} x_{ij} \leq b_i, \quad \forall i \in \{1, \dots, m\}$$

$$\sum_{i=1}^{m} x_{ij} = 1, \quad \forall j \in \{1, \dots, n\}$$

$$x_{ij} \in \{0,1\},\ \forall i \in \{1, \dots, m\},\ \forall j \in \{1, \dots, n\}$$

Generate an instance $m \times n$ with coefficients randomly generated as follow:

- $1 \leq p_{ij}^1,\ p_{ij}^2,\ w_{ij} \leq 10$
- $b_i = \lfloor \frac{\sum_{j=1}^{m} w_{ij}}{2} \rfloor$

and:

- compute Y_N , the set of non-dominated points
- plot Y_N

Entrée [ ]: