

# Continuous optimization

## PGE305

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## Exercise 7

*Parameters.*

$n$	number of cereals	
$T$	number of time steps	
$S_{min}$	minimal volume	
$S_{max}$	maximal volume	
$S_i$	initial volume	
$S_f$	minimal final volume	
$A_{max}$	available area	
$Q$	incoming flow	$t \in \{1, \dots, 12\}$
$B$	unitary revenue	$i \in \{1, \dots, 4\}$
$d$	need for water	$i \in \{1, \dots, 4\}, t \in \{1, \dots, 12\}$

## Exercise 7

*Variables.*

$x$	area	$i \in \{1, \dots, n\}$
$R$	withdrawn volume	$t \in \{1, \dots, T\}$
$D$	allocated volume	$t \in \{1, \dots, T\}$
$S$	volume in the reservoir	$t \in \{0, \dots, T\}$

*Costs.*

$$\max \sum_{i=1}^n B[i]x[i].$$

## Exercise 7

### Constraints.

$S[t] \geq S_{min}$	$t \in \{1, \dots, T\}$	Lower bound of reservoir
$S[t] \leq S_{max}$	$t \in \{1, \dots, T\}$	Upper bound of reservoir
$x[i] \geq 0$	$i \in \{1, \dots, n\}$	Non-negativity
$\sum_{i=1}^n x[i] \leq A_{max}$		Available area
$\sum_{i=1}^n d[i, t]x[i] = 0.5D[t]$	$t \in \{1, \dots, T\}$	Need for water
$S[0] = S_i$		Initial volume in reservoir
$S[t - 1] + Q[t] - R[t] = S[t]$	$t \in \{1, \dots, T\}$	Evolution of reservoir
$D[t] \leq R[t]$	$t \in \{1, \dots, T\}$	Allocated vs. withdrawn water
$S[T] \geq S_f$		Final bound of reservoir