Optimization theory

$n = 4; m = 5;$

$\text{aMatrix} = \text{RandomInteger}[\{1, 100\}, \{m, n\}]$

$\{\{83, 63, 57, 65\}, \{36, 57, 49, 65\}, \{91, 11, 10, 40\}, \{50, 56, 6, 49\}, \{95, 65, 49, 75\}\}$

$d = \text{RandomInteger}[\{40, 60\}, m]; (*\text{cost per unit of material}*)$

$c = \text{RandomInteger}[\{60, 80\}, n]; (*\text{cost per unit of item}*)$

$s = \text{RandomInteger}[\{20, 100\}, n]; (*\text{supply}*)$

$b = \text{RandomInteger}[\{20, 100\}, m]; (*\text{constraints}*)$

$\text{nc} = \text{Table}[0, n](*\text{natural constraints}*)$

$\{0, 0, 0, 0\}$

$\text{result} = \text{LinearProgramming}\left[\text{Table}\left[c[[i]] - \sum_{j=1}^{m} \text{aMatrix}[[j, i]] * d[[j]], \{i, 1, n\}\right], \text{Table}[\text{Table}[\text{aMatrix}[[j, i]], \{$

$\left\{\frac{236}{695}, 0, 0, \frac{683}{3475}\right\}$

$\text{fun}[\text{x\_}] := \text{Sum}\left[\left(c[[i]] - \sum_{j=1}^{m} \text{aMatrix}[[j, i]] * d[[j]]\right) x[[i]], \{i, 1, n\}\right]$

$\text{fun}[\text{result}]//N$

-9550.45

Maximize

Consumer basket

$n = 4; m = 5;$

$\text{contentsMatrix} = \text{RandomInteger}[\{0, 100\}, \{n, m\}];$

$\text{costs} = \text{RandomInteger}[\{50, 100\}, n]; (*\text{product cost}*)$

$\text{b1} = \text{RandomInteger}[\{10, 100\}, m - 1]; (*\text{constraints of contents}*)$

```
bm = RandomInteger[{500, 1000}]; (*constraint of calorific*)
nc1 = Table[1, n](*natural constraints*)
```

$$\{1, 1, 1, 1\}$$

```
LinearProgramming[Table[costs[[i]], {i, 1, n}], Table[Table[contentsMatrix[[i, j]], {i, 1, n}], {j, 1, m}], Append[Ta
nc1]//N
```

$$\{4.76923, 1., 1., 1.\}$$

```
contentsMatrix//MatrixForm
```

$$\begin{pmatrix} 79 & 55 & 53 & 13 & 88 \\ 73 & 12 & 64 & 9 & 84 \\ 52 & 56 & 75 & 9 & 61 \\ 62 & 99 & 80 & 2 & 82 \end{pmatrix}$$