

Assignment 1:

Submitted by : Adrita Dutta (axd172930)

1) Formulate the following as a linear programming problem.

A candy manufacturer has 130 pounds of chocolate-covered cherries and 170 pounds of chocolate-covered mints in stock.

He decides to sell them in the form of two different mixtures.

One mixture will contain half cherries and half mints by weight and will sell for \$2.00 per pound.

The other mixture will contain one-third cherries and two-thirds mints by weight and will sell for \$1.25 per pound.

How many pounds of each mixture should the candy manufacturer prepare in order to maximize his sales revenue?

Solution:

LP Formulation:

$$\Rightarrow \text{Max: } 2x_1 + 1.25x_2$$

$$\text{Constraints: } 0.5x_1 + 0.33x_2 \leq 130$$

$$0.5x_1 + 0.67x_2 \leq 170$$

Final answer:

$$Z(\text{Max Sales Revenue}) = \$520$$

$$x_1 = 260(\text{Mix1}) \rightarrow 130(\text{chocolate-covered cherries} \rightarrow R1) + 130(\text{chocolate-covered mints} \rightarrow R2)$$

$$x_2 = 0(\text{Mix2})$$

Matrix of problem:

	Mix 1	Mix2	TOTAL QUANTITY AVAILABLE	
	0.5	0.33	130	chocolate-covered cherries(R1)
	0.5	0.33	170	chocolate-covered mints(R2)
COST/pound	\$2	\$1.25		

Screenshots:

1)lp formualtion

The screenshot displays the LPSolve IDE interface. The main window shows the LP formulation code, and the bottom panel shows the solver's log output.

LP Formulation Code:

```

1 /* Objective function */
2 max: 2 x1 + 1.25 x2 ;
3
4 /* Variable bounds */
5 0.5 x1 + 0.33 x2 <= 130 ;
6 0.5 x1 + 0.67 x2 <= 170 ;

```

Solver Log Output:

```

Log Messages
Relative numeric accuracy ||*|| = 0

MEMO: lp_solve version 5.5.2.5 for 32 bit OS, with 64 bit REAL variables.
In the total iteration count 1, 0 (0.0%) were bound flips.
There were 0 refactorizations, 0 triggered by time and 0 by density.
... on average 1.0 major pivots per refactorization.
The largest [LUSOL v2.2.1.0] fact(B) had 3 NZ entries, 1.0x largest basis.
The constraint matrix inf-norm is 0.67, with a dynamic range of 2.0303.
Time to load data was 0.002 seconds, presolve used 0.008 seconds,
... 0.013 seconds in simplex solver, in total 0.023 seconds.

```

2)matrix

LPSolve IDE - 5.5.2.5 - C:\Users\adrit\Desktop\ATN\assignment 1\Assignment 1\Assignment1.lp

File Edit Search Action View Options Help

Source Matrix Options Result

	x1	x2	RHS
max	2	1.25	0
R1	0.5	0.33	130
R2	0.5	0.67	170

Log Messages

Relative numeric accuracy ||*|| = 0

MEMO: lp_solve version 5.5.2.5 for 32 bit OS, with 64 bit REAL variables.
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3)objective:

LPSolve IDE - 5.5.2.5

File Edit Search Action View Options Help

Source Matrix Options Result

Objective Constraints Sensitivity

Variables	result
	520
x1	260
x2	0

Log Messages

Relative numeric accuracy ||*|| = 0

MEMO: lp_solve version 5.5.2.5 for 32 bit OS, with 64 bit REAL variables.
 In the total iteration count 1, 0 (0.0%) were bound flips.
 There were 0 refactorizations, 0 triggered by time and 0 by density.
 ... on average 1.0 major pivots per refactorization.
 The largest [LUSOL v2.2.1.0] fact(B) had 3 NZ entries, 1.0x largest basis.
 The constraint matrix inf-norm is 0.5, with a dynamic range of 1.51515.
 Time to load data was 0.003 seconds, presolve used 0.012 seconds,
 ... 0.021 seconds in simplex solver, in total 0.036 seconds.

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25:6 ITE: 0 INV: 2 NOD: 0 TME: 0.02

4) constraints:

LPSolve IDE - 5.5.2.5

File Edit Search Action View Options Help

Source Matrix Options Result

Objective Constraints Sensitivity

Constraints	result
	520
R1	130
R2	130

Log Messages

Relative numeric accuracy $||^+|| = 0$

MEMO: lp_solve version 5.5.2.5 for 32 bit OS, with 64 bit REAL variables.
 In the total iteration count 1, 0 (0.0%) were bound flips.
 There were 0 refactorizations, 0 triggered by time and 0 by density.
 ... on average 1.0 major pivots per refactorization.
 The largest [LUSOL v2.2.1.0] fact(B) had 3 N2 entries, 1.0x largest basis.
 The constraint matrix inf-norm is 0.5, with a dynamic range of 1.51515.
 Time to load data was 0.003 seconds, presolve used 0.012 seconds,
 ... 0.021 seconds in simplex solver, in total 0.036 seconds.

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25:6 ITE: 0 INV: 2 NOD: 0 TME: 0.02

5) sensitivity:

File Edit Search Action View Options Help

Source Matrix Options Result

Objective Constraints Sensitivity

Objective Duals

Variables	from	till	from value	till value
objective	520	520	520	520
x1	1.89393939...	+inf	-inf	0
x2	-inf	1.32	393.939393939...	0

Log Messages

Relative numeric accuracy ||*|| = 0

MEMO: lp_solve version 5.5.2.5 for 32 bit OS, with 64 bit REAL variables.
In the total iteration count 1, 0 (0.0%) were bound flips.
There were 0 refactorizations, 0 triggered by time and 0 by density.
... on average 1.0 major pivots per refactorization.
The largest [LUSOL v2.2.1.0] fact(B) had 3 NZ entries, 1.0x largest basis.
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