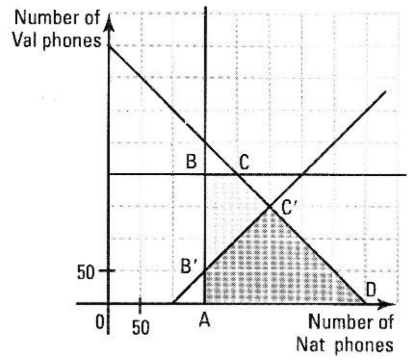
4. A cell phone company makes Nat model phones and Val model phones.

The company expects a revenue of \$40 per Nat phone and \$60 per Val phone.

To satisfy production constraints, the company must produce monthly,

- at most 400 cell phones;
- at least 150 Nat phones;
- at most 200 Val phones.



a) Identify the variables in this situation.

x: number of Nat phones; y: number of Val phones.

b) Translate the constraints into a system of inequalities.

$x \geqslant 0$

$y \geqslant 0$

$x + y \leqslant 400$

$x \geqslant 150$

$y \leqslant 200$

c) Draw the polygon of constraints.

d) Establish the rule of the function to be optimized.

$R = 40x + 60y$

e) Evaluate the function to be optimized at each vertex of the polygon of constraints.

Vertices	$R = 40x + 60y$
A(150, 0)	6000
B(150, 200)	18 000
C(200, 200)	20 000
D(400, 0)	16 000

f) How many cell phones of each model must the company make in order to maximize its revenue?

It must make 200 Nat phones and 200 Val phones.

g) After one week of production, the company decides to make at least 100 more Nat phones than Val phones.

Translate this additional constraint into an inequality. $x \geqslant y + 100$

h) Evaluate the function to be optimized at each vertex of the new polygon of constraints then determine the number of cell phones of each model the company must make in order to maximize its revenue.

It must make 250 Nat phones and 150 Val phones.

Vertices	$R = 40x + 60y$
A′(150, 0)	6000
B′(150, 50)	9000
C′(250, 150)	19 000
D(400, 0)	16 000

i) Did the maximal revenue increase or decrease as a result of this additional constraint?

It decreased by \$1000.