Loops

PC L05 Problems with loops

Problem 1

Triangle

You are given four positive integers a, b, c, d, such that $a \le b \le c \le d$.

Your task is to find three integers x, y, z, satisfying the following conditions:

$a \le x \le b$.
$b \le y \le c$.
$c \le z \le d$.

There exists a triangle with a positive non-zero area and the lengths of its three sides are x, y, and z.

Input
A line that describe test case. The test case is given as four space-separated integers a, b, c, d ($1 \le a \le b \le c \le d \le 1000$).

Output
Print three integers x, y, z — the integers you found satisfying the conditions given in the statement.

It is guaranteed that the answer always exists. If there are multiple answers, print any.

Code

```
#include <stdio.h>
int main()
{
int a,b,c,d, x, y, z;
scanf("%d %d %d %d", &a, &b, &c, &d);
for (x = a; x <= b; x++)
        for (y = b; y <= c; y++)
            for (z = c; z <= d; z++)
                if (x + y > z)
                    {
                        printf ("%d %d %d YES", x, y, z);
                        return 0;
                    }
printf("NO\n");
return 0;
}
```

Problem 2

bookshelves

A company produces two models (A, B) of bookshelves. For model A you need 3 m^2 of planks, for model B - 4 m^2 . The company is supplied with 1700 m^2 of planks per week. The production of a type A bookshelf lasts 12 minutes, of a type B bookshelf - 30 minutes. The working week has 160 hours.

How many type A bookshelves and how many type B bookshelves the company will produce, if the income from a type A bookshelf is $ 2, and from a type B bookshelf - $ 4.

Let x_1 – the quantity of produced bookshelves of type A, x_2 – the quantity of produced bookshelves of type B.

The problem is to find maximal value for expression $P = 2x_1 + 4x_2$ in restrictions:
$x_1 \geq 0$, $x_2 \geq 0$

$3x_1 + 4x_2 \leq 1700$ (suppliers)

$0.2\ x_1 + 0.5x_2 <= 160$ (time)

Observations

Maximal number of type A bookshelves is $1700 / 3 < 567$

Maximal number of type B bookshelves is $1700 / 4 < 426$

So: $1 \leq x1 \leq 567;\ 1 \leq x2 \leq 426;$

Code

```
#include <stdio.h>
#define n1 566
#define n2 425
int main()
{
    int x1, x2, maxf = 0, bestx1, bestx2, z;
    for (x1 = 0; x1 <= n1; x1++)
         for (x2 = 0; x2 <= n2; x2++)
              if (3 * x1 + 4 * x2 <= 1700
                  && x1 * 0.2 +  x2 * 0.5 <= 160)
              {
                  z = 2 * x1 + 4 * x2;
                  if (z > maxf)
                          {
                              maxf = z;
                              bestx1 = x1;
                              bestx2 = x2;
                          }
              }
printf("Type A: %d Type B: %d\n Income: %d",
           bestx1, bestx2, maxf);
return 0;
}
```

E3 Să se maximizeze funcţia:

$$L = x_1 + 3x_2 + 3x_3$$
$$L \to \max$$

Restricţii

$$\begin{cases} x_2 + x_3 \le 3 \\ 3x_1 + x_2 \le 15 \\ x_2 \ge 1 \\ x_1 - x_2 \ge 0 \end{cases}$$

Să se maximizeze funcţia:

$$L = 3x_1 - 6x_2 + 2x_3$$
$$L \to \max$$

Restricţii

$$\begin{cases} 3x_1 + 3x_2 + 2x_3 \le 6 \\ x_1 + 4x_2 + 8x_3 \le 8 \end{cases}$$

E5 Să se maximizeze funcţia:

$$L = x_1 + 3x_2$$
$$L \to \max$$

Restricţii

$$\begin{cases} x_1 + 4x_2 \ge 4 \\ x_1 + x_2 \le 6 \\ x_2 \le 2 \end{cases}$$

E6 Să se minimizeze funcţia:

$$L = x_1 - x_2$$
$$L \to \min$$

Restricţii

$$\begin{cases} 3 \le x_1 + x_2 \le 7 \\ 1 \le x_2 \le 4 \\ x_1 \le 4 \end{cases}$$