

## Integer Programming. Solutions

1. The optimal solutions to the IP problems, using the graphical solution:

1.1  $x_1^* = 5, \quad x_2^* = 2, \quad z^* = 13.$

1.2  $x_1^* = 14, \quad x_2^* = 2, \quad z^* = 100.$

2. The optimal solutions to the IP problems:

2.1  $x_1^* = 5, \quad x_2^* = 2, \quad z^* = 13.$

2.2  $x_1^* = 14, \quad x_2^* = 2, \quad z^* = 100.$

2.3  $x_1^* = 0, \quad x_2^* = 0, \quad x_3^* = 5, \quad z^* = 15.$

2.4 There are multiple optimal solutions:

$x_1^* = 3, \quad x_2^* = 0, \quad x_3^* = 9, \quad z^* = 12.$

$x_1^* = 4, \quad x_2^* = 2, \quad x_3^* = 6, \quad z^* = 12.$

3. The optimal solutions to the 0-1 IP problems:

3.1 There are multiple optimal solutions:

$x_1^* = 1, x_2^* = 0, x_3^* = 1, x_4^* = 0, x_5^* = 1, \quad z^* = 17.$

$x_1^* = 1, x_2^* = 1, x_3^* = 0, x_4^* = 1, x_5^* = 1, \quad z^* = 17.$

3.2  $x_1^* = 1, x_2^* = 0, x_3^* = 0, x_4^* = 1, x_5^* = 1, \quad z^* = 15.$

3.3  $x_1^* = 1, x_2^* = 1, x_3^* = 1, x_4^* = 0, x_5^* = 0, \quad z^* = 19.$

3.4  $x_1^* = 0, x_2^* = 1, x_3^* = 0, x_4^* = 0, x_5^* = 1, x_6^* = 1, \quad z^* = 17.$

3.5  $x_1^* = 0, x_2^* = 1, x_3^* = 1, x_4^* = 1, \quad z^* = 1.$

4. Components  $C_4, C_5$  and  $C_6$  are selected to be carried in the box.

$x_1^* = 0, \quad x_2^* = 0, \quad x_3^* = 0, \quad x_4^* = 1, \quad x_5^* = 1, \quad x_6^* = 1, \quad z^* = 16.$