Step-1

The coefficient of x_1 is positive and the coefficient of x_2 is negative in the cost function. Therefore, if x_1 is increased, the cost will go on increasing. However, if x_2 is increased, the cost will go down.

Therefore, x_2 should be increased from its current value.

Step-2

The second constraint is given by $3x_1 + 6x_2 + x_4 = 12$. When x_2 is increased to 2, we have $6x_2 = 12$, which is equal to the right hand side.

Since, we have the non-negativity constraint $x_1, x_2, x_3, x_4 \geq 0$, it is easy to see that this forces x_4 to be equal to zero.

Thus, x_2 can be increased to 2.