

### 1. Problem

Given the following information:

$$\begin{array}{ccccccccc}
 \text{banana} & + & \text{pineapple} & + & \text{pineapple} & = & 909 \\
 \text{banana} & + & \text{pineapple} & + & \text{banana} & = & 516 \\
 \text{pineapple} & + & \text{orange} & + & \text{pineapple} & = & 921
 \end{array}$$

Compute:

$$\text{banana} + \text{orange} + \text{pineapple} = ?$$

- (a) 434
- (b) 378
- (c) 921
- (d) 678
- (e) 528

### Solution

The information provided can be interpreted as the price for three fruit baskets with different combinations of the three fruits. This corresponds to a system of linear equations where the price of the three fruits is the vector of unknowns  $x$ :

$$x_1 = \text{banana} \quad x_2 = \text{orange} \quad x_3 = \text{pineapple}$$

The system of linear equations is then:

$$\begin{pmatrix} 1 & 0 & 2 \\ 2 & 0 & 1 \\ 0 & 1 & 2 \end{pmatrix} \cdot \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} 909 \\ 516 \\ 921 \end{pmatrix}$$

This can be solved using any solution algorithm, e.g., elimination:

$$x_1 = 41, x_2 = 53, x_3 = 434.$$

Based on the three prices for the different fruits it is straightforward to compute the total price of the fourth fruit basket via:

$$\begin{array}{ccccccc}
 \text{banana} & + & \text{orange} & + & \text{pineapple} & = & \\
 x_1 & + & x_2 & + & x_3 & = & \\
 41 & + & 53 & + & 434 & = & 528.
 \end{array}$$