Lesson 7. Production Process Models

Example 1. Midville Manufacturing assembles heavy-duty handling carts. Each cart consists three components: wheels, steering yokes, and carrying platforms. These components are first assembled separately. Then each steering yoke is equipped with 4 wheels to form the front-end subassembly. Finally, front-end subassemblies are combined with 1 carrying platform and 8 additional wheels to complete the cart.

Components, subassemblies, and finished carts require the following amounts of assembly time, and can be sold at the following prices:

Index	Item	Assembly time per unit (hrs)	Price per unit ($)
1	Wheels	0.06	120
2	Steering yokes	0.07	40
3	Carrying platform	0.04	75
4	Front-end subassembly	0.12	400
5	Finished carts	0.32	700

There are 1150 hours of assembly time available.

Write a linear program that determines a production plan for Midville Manufacturing that maximizes its revenue.

Example 2. The Simplex Company produces 3 products: A, B, and C. These products can be sold in unlimited quantities at the following unit prices:

Product	A	B	C
Price	10	50	100

The production requirements are as follows. Producing one unit of product A requires 1 hour of labor. Producing one unit of product B requires 2 hours of labor plus 2 units of A. Producing one unit of product C requires 3 hours of labor plus 1 unit of B. In addition, any units of product A used to produce product B cannot be sold, and any units of product B used to produce product C cannot be sold. A total of 40 hours of labor are available. Formulate a linear program to maximize the company's revenues.