

UNIVERSITY OF MASSACHUSETTS

Isenberg School of Management

Department of Finance and Operations Management

FOMGT 353-Introduction to Management Science

LP Example #1 – Profit Maximization.

The management of Artificial Limb Company is trying to determine the amount of each of three products to produce over the coming planning period. The following information concerns labor availability, labor utilization, and product profitability.

Department	Product (hours/unit)			Labor-Hours
	Ankles	Hips	Knees	Available
Molding	1.00	0.35	0.5	100
Finishing	0.30	0.20	0.4	70
Quality	0.20	0.50	0.2	50
Profit contribution/unit	\$30.00	\$15.00	\$25.00	

- Develop a linear programming model of the Artificial Limb Company problem. Solve the model to determine the optimal production quantities of products Ankles, Hips and Knees.
- In computing the profit contribution per unit, management doesn't deduct labor costs because they are considered fixed for the upcoming planning period. However, suppose that overtime can be scheduled in some of the departments. Which departments would you recommend scheduling for overtime? How much would you be willing to pay per hour of overtime in each department?
- Suppose that 10, 6, and 8 hours of overtime may be scheduled in Molding, Finishing and Quality departments, respectively.

The cost per hour of overtime is \$18 in Molding, \$22.50 in Finishing, and \$12 in Quality.

Formulate a linear programming model that can be used to determine the optimal production quantities, if overtime is made available.

What are the optimal production quantities, and what is the revised total contribution to profit? How much overtime do you recommend using in each department? What is the increase in the total contribution to profit if overtime is used?