Integer Linear Programs

Floyd's Fabrication

Floyd's Fabrication has just received an order from Gumbal Plumbing Fixtures for 100,000 specially designed 3-in diameter casings to be delivered in one week. The contract price was negotiated up front; hence Floyd's maximum profit will be obtained when costs are minimized.

Floyd's has three production facilities capable of producing the casings. Production costs do not vary between locations, but the setup costs do vary as does the cost of transporting the finished goods to Gumbal.

Location	Setup Cost	Transportation per '000 units	Maximum Weekly Production
Springfield	\$1,200	\$224	65,000
Oak Ridge	\$1,100	\$280	50,000
Westchester	\$1,000	\$245	55,000

Formulate this problem as a mathematical model.

Sales

The sales manager for a publisher of college texbooks has six traveling salespeople assigned to three different regions of the country. She has decided that each region should be assigned at least one salesperson and that each individual salesperson should be restricted to one of the regions. Given these restrictions, the manager wants to determine how many salespeople should be assigned to the respective regions in order to maximize sales.

The following table gives the estimated increase in sales (in appropriate units) in each region if it were allocated various numbers of salespeople:

	Region		
Salespersons	1	2	3
1	35	21	28
2	48	42	41
3	70	56	63
4	89	70	75

Formulate this problem as a mathematical model.

LittleTrykes

The R&D department of LittleTrykes, Inc. has developed six new prototype tricycle models that can go into production in the coming year. The amount of plastic and the big and small wheels as well as some other information for each model is presented below.

Model	Unit Profit	Small Wheels	Big Wheels	Plastic (lbs)	Setup Costs
Liltryke	\$1.50	3	0	0.8	\$16,500
Pinktryke	\$2.00	1	2	1.2	\$18,000
Herotryke	\$2.25	2	1	1.5	\$17,500
RobinHood	\$2.75	2	1	2.1	\$18,000
Jeeptryke	\$3.00	2	1	1.8	\$20,000
Monster	\$3.50	0	3	3.0	\$17,000
Avail. per Month		10,000	8,000	9,000	

Find the optimum production schedule if

- The total budget available for new setups is \$70,000.
- If the Herotryke is produced then the RobinHood will NOT be produced.
- There should be at least four new models.
- If the Jeeptryke is produced then the Monster should be produced as well.
- At least 1,500 lbs of plastic should be left over each month for new models.