Decision Sciences

Exercise Integer Programming - Product line investment

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Problem description

Metropolitan Microwaves, Inc. is planning to expand its operations into other electronic appliances. The company has identified seven new product lines it can carry. Relevant information about each line is given in the following table:

Table: Data for Metropolitan Microwaves

Product line	Initial investment	Floor space (sq. ft.)	Expected rate of return
Black and white TVs	6,000	125	8.10%
Color TVs	12,000	150	9.00%
Large screen TVs	20,000	200	11.00%
VHS VCRs	14,000	40	10.20%
Beta VCRs	15,000	40	10.50%
Video Games	2,000	20	14.10%
Home computers	32,000	100	13.20%

Metropolitan has decided that they should not stock large screen TVs unless they stock either B&W or color TVs. Also, they will not stock both types of VCRs, and they will stock video games only if they also stock color TVs. Finally, the company wishes to introduce at least three new product lines.

a) If the company has €45,000 to invest and 420 sq. ft. of floor space available, formulate an integer linear program for Metropolitan to maximize its overall expected rate of return.
b) Solve your model and discuss the results.